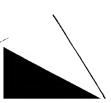SEQUENCE LISTING

<110> VELASCO IGLESIAS, ANA
DE LA CALLE, FERNANDO
APARICIO PEREZ, TOMAS
SCHLEISSNER SANCHEZ, CARMEN
ACEBO PAIS, PALOMA
RODRIGUEZ RAMOS, PILAR
REYES BENITEZ, FERNANDO
HENRIQUEZ PELAEZ, RUBEN

<120> THE GENE CLUSTER INVOLVED IN SAFRACIN BIOSYNTHESIS AND
ITS USES FOR GENETIC ENGINEERING

<130> 4126-4030

<140>
<141>

<150> PCT/GB03/005563
<151> 2003-12-19

<150> GB 0229793.5
<151> 2002-12-20

<160> 34

<170> PatentIn Ver. 3.3

<210> 1
<211> 26705
<212> DNA
<213> Pseudomonas fluorescens A2-2

<220>
<221> misc_feature
<222> (6080)..(9268)
<223> SacB: non ribosomal peptide synthetase gene

<220>
<221> misc_feature
<222> (9275)..(13570)
<223> SacC: non ribosomal peptide synthetase gene

<220>
<221> misc_feature
<222> (13602)..(14651)
<223> SacD: hypothetical protein gene

<220>
<221> misc_feature
<222> (14719)..(14901)
<223> SacE: hypothetical protein gene

<220>
<221> misc_feature
<222> (14962)..(16026)
<223> SacF: methyl-transferase protein gene

<220>
<221> misc_feature
<222> (16115)..(17155)
<223> SacG: methyl-transferase protein gene

<220>
<221> misc_feature
<222> (17244)..(17783)
<223> SacH: hypothetical protein gene

<220>
<221> misc_feature
<222> (1854)..(2513)
<223> SacI: complementary, methyl-transferase
      protein gene

<220>
<221> misc_feature
<222> (335)..(1861)
<223> SacJ: complementary, mono-oxygenase
      protein gene

<220>
<221> misc_feature
<222> (18322)..(19365)
<223> Orf1: aminoacid peptidase-like protein

<220>
<221> misc_feature
<222> (21169)..(22885)
<223> Orf2: complementary; hox-like regulator protein

<220>
<221> misc_feature
<222> (23041)..(23730)
<223> Orf3: complementary; glycosil transferase-like
      protein

<220>
<221> misc_feature
<222> (25037)..(26095)
<223> Orf4: isochorismatase-like protein

<400> 1
ctgcaggtgg tttgcgcgcg gaagacccgc cactgccggt gcgctcgttt gaattgcaca 60
tggcgtggcg tgggtcgcag gataatgatc cggggagcg gtggttgcgg tcgcggattc 120
agatgttttt tggcgacccc gatagccttt aattaaactc cactaaaatc ggcgattgca 180
gagcctgagt acaacacggc tactggactg aagtgggcgc atcgtgccgc atagccatag 240
tgatctcggt gtgtctcgcc atgtcccggc ccaggtcgta ggtcatgctc ttgcgcattg 300
ccagcatctt cgtgctccct tgccagctgt ttcaggtcag gctctgacgc gcggatttag 360
aatcgtccag cagccactca cccaagcgct ccttggccaa ggtcgatttt ttaccgaccc 420
agatcaccac gccatccggc ctgacgatga ctccctcgcc agcggacaag ctgttattgt 480
gcgaatcctc gcagatagat gccgtttgca accccggaaa atcacgtcga agatcggcgg 540
ccagtgcttt ggcacgatga tgtaccagga caaaccgccc tgctcgcagc aactgggtca 600
agctctgtcg tggtaatcgc tcaccctcgg gaagcaggct caacagggt aaacgtcggc 660
ccaccaagcg atgatcgcct cggcgccgca cactgtcata gcgcacgccc tctcccgcca 720
gtgcactgac caccttctgc gccacatacg gggcccgtgt cgcctgcaag ccgatccagt 780

```
gaatcagacg gcctataggg ccggaagccg tattgaatcg gaaaagcaga tccgtgttgc 840
gcaaggctgc cgccgcaata ggcctacgct cggcctcgta actctccaga agatccatcg 900
gcaatgtggc ctgtatcaca cccgccagct tccaggcgag gttcgccgcg tcaccgatcc 960
ccatctgcaa accttgcccc ccggcggggga cgtgggtgtg agcagcatct cccagcagaa 1020
ataccctccc ctggcgataa tgagtcgcca ggcgctgctg gctgcggtaa cgagcgctcc 1080
acagcacctg cgccaatccg aaatcggttc ccagaatatc tttcatccct ccggcaattt 1140
cctcgtgggt gaccggctgt ttgaccggag tatccatacg ttcgttgtct tcgatactga 1200
cgcgataact gccatcgggt aatggaaaca gggcaaccag acccctggag accgaccttg 1260
catggactgc aggtgaaggc ggatttctca agacaacgtc cgccaccacc aacgaatgct 1320
tgtagtcctg cccgacaaac gaaatattga ggagttggcg gacagaactg ttgaccccat 1380
cagcccccag cacccagtcg tagcggcttt gctgcacgct gccggtctcg ctgtgttcca 1440
gggttacctc aacgtgtaaa tcgccggcat ccagagcctt tagcgcatac ccacgcttca 1500
gattcacccc cttgcgattg acccaatcag tcaacaccga ctcggtctga gactgtggga 1560
tgatcaccat gtggggatac tcacaaggga gtttggaaaa tgagagcgtt cggcccgcct 1620
tgtcacccaa cggcgcgctt gcccagacga tcccccgacg tatcatctca tctgccacgc 1680
cccaggcatt gagcaactcc agggtcacgg gctccaagcc aaaggcccgg gaatggggag 1740
aggcagccga tcttttatcg atgagatcaa ccgctatacc caactcggcc agagctgcag 1800
ccacagccaa cccgacgggc cccgcccca cgaccaggac ctgtttattt ttaacgacca 1860
tgatcaccca cctctccaca gcaggggcgg aacgtggcga caatgacgtg ctggtcggtg 1920
acgctcgttt ccatgctctg cagcccggcc gtttgcgcga gctggattac ctcatgctct 1980
gatcgataat ctgccagtga gcccagcagc cagttgatca atgtggtcaa tccccagccc 2040
gcaggcaggt tctccaccag gcagaaaagg ccctgaggct tgagcacgcg acggacctca 2100
ttcaggctga cagacttgtc agcccaatgg ccgaacgaca tcgagcacac caccagatcc 2160
atgctttgcg aggggaatgg caaggcttcg gcaactcctt tgacgaacga ggcgaaggga 2220
cgtcgtttgg cggcctcgtc gaccatgccc tgagccgggt cgacgccttc gaagcgcgcc 2280
tcaggccaca gagcgaacat gcgttcgatc aatgcgccgg taccacaacc gatgtccaga 2340
acacgctccg gtctcgaggt gcacatccat cggctcaaca ttcgcagaca gtcgtcatgg 2400
gcctggctca gtttggtacc gtacttctct tcatacgtcg gcgcgatacg gctgaacgtc 2460
cgcacaaaac ctggatttcc attgcctttc ccgccagaaa atacgttaga cattattgaa 2520
catccatata tcaacagtta tccgccaagg accatagtag agaaaatcca tcccatccaa 2580
ataaaaatta aataagtggg gctaaccgca atccagggaa actctgaaaa ggcccgctac 2640
ttgtcgacgc ggctgtctgg aggccgcata gttactgaac ttactattaa aagactgggc 2700
tttttcagag ccccaccgga tgttggctcc ttgtccatca tttcgggggc actgtaacat 2760
tctgttacct ggctatcgct tgactttaa tctgaacggg caattatagg tctaaccgca 2820
acagccccac ggcgcttaag ttcgaaaaaa gtagctgcac cttgctcaac tgcatcttgt 2880
aataagggggc actttacaag ccgcataaga cataaatttt atgctgactc cccaaacaag 2940
cacgacaagt aaaaaacact tgtccaatac caaggagggt atacggtgca agcttcttta 3000
cgtcaaaaag ttctctgctt acagcagtct atcgatccca gccagccagg catgttactt 3060
gaagtcgctt ttcatgtgat cacccatctt tctacttcgc agttggtatc gcgtatcgag 3120
agagtggtcg agcgacatgc gtctttacgg cagcgctttg tcatgcgcaa tggcacttac 3180
tggattgaac aagccccacc gcaacaacga cgctactgcg tggtacgcac ctatgatgaa 3240
gcatcgaccg atgcactgct ggcgccgagc cgcgagcaca tcgggggttga gtctgagcgt 3300
ttgttccgcg ccgaagtcgt tgagcgcagc gacggacaac gctacttggt cttccggaatt 3360
catcacatca tcgccgacct gtggtctgtc ggcctcctga ttcgagactt tgccgaagac 3420
tgtatggacc gctccagcat caccctggcg tcaagaccga ttgccccgtt gatcgaccct 3480
gagttctggc ggcaccaaat gtcacaggac actccgtttt ccttgcccat ggcctccctg 3540
gaacagcaca cggaccgccg catggtgctg tcttcgttcg ttattgatca ggagagcagc 3600
gctgacctgg cccgcctggc cacagcctgc gcggtaaccc cgtacaccgt aatgctcgcc 3660
gcacaagtat tggcgctgtc cagaatcggc cagagtggcc gtctgtcact tgcggtgacg 3720
ttccatggcc gcaacagggg caacaaggat gcggtaggtt acttcgccaa tacgcttgcc 3780
gtgcctttcg atgtcagcga atgcagcgtg ggcgagtttg tcaaacgcac cgccaagcgc 3840
ctggatgagg cctcaaaagc cagcgtcggt gccggttatc ccgaattggc agagttcatg 3900
acgccgctgg gatgggctgc gaccgccccg accaatgcgg tgatttacca gcaggatatg 3960
ccaggcatgc caagaggatt ggcggcggct ctgctgggat tgggcacggt gcagttgggc 4020
gagatggcgc tgaccgcgga acaggcaccg cccagcatcg gcccgtttgc cactgcgctg 4080
ctgctgacgc gccacgacgg caagctgcat ggccgggtcg aggtcgatcc tgcgcagcat 4140
cccggttggc tggcagaggc gttagccaga cagttcgctg tgatcctgcg ggaaatggtg 4200
cgtgatccac aggccagact gtcagccttg ccagcgtgcc tgttacacca accaaaatac 4260
```

```
ccgagccaag cgcggccggc gcctgcgtca gaaacattgg tagccacctt tctccggcaa 4320
gtcgccatca cgccggacaa gcccgcgctg cgtacgccgc aggccagcat cagctatagc 4380
gaattggcca gtcgagtcgc caggctctcg gcagccttgc gcgtacgcgg cttcaaacct 4440
gaacagaccc tggcaatact cctgcctcgc gatatcaatc tggtacccgc tctgctggcg 4500
atcatggcct gcggtggcag ttatgtgcca ctcagtgacg cgaaccccgc cgaactcaac 4560
cgttcgattc tgaccagggc ccgttgccgc gcgattctca cggatcagga gggtttgacc 4620
cgtttcgctc acttggcgcc ctgctggtcc ttgagcgacc tgctgtcgat gcccgacgcc 4680
ccgctgcagg accagtccaa gcttcaagcc aaggcctata tcctatttac cagcggctcc 4740
accggtgaac caaaaggcgt ggcgatcacc catgctaatg ccgccaacct gctgcgttgg 4800
gcggctctcg attgtggccc cgagtacctg gcgcaaacac tggcggcaac ccccactacg 4860
ttcgatcttt cgattttcga gatgtttgct ccccttatgg tcggtggctg cgtacagccc 4920
gtttcctcgg tcatggcgct gatcgacaat ccggccctgc taaagggcac aacactgatc 4980
aatacggtgc cgtcggtggc cgacgctttg ttgcagcatg atgtactggt gccttccttg 5040
cgcatgctca acctcgcggg agaacccctg aaccgggatc tttacctgcg gcttcaggca 5100
aaactgaccg ccacacgcat cgtcaacctc tacggcccga cggaaacaac aacctattcc 5160
accgccctgg tgatcgagcc cgcacaacaa gagatcacca tcggtttttc actgtatggc 5220
acctgggtgg atgtcgttga tcaaaacatg caaagcgtcg gtatcggtgt acctggcgag 5280
ttgatcattc atggacacgg cgtggcgcaa ggctatgtca gcgaccccgt gcgtagcgcc 5340
gcttctttcc tgccggcatc cgatggcttg cgttgctacc gcacgggaga ccgtgtccgc 5400
tggttgcccg atggccgcct ggactttatc ggtcgagagg atgatcaggt caaagttcgc 5460
ggtttccggg tcgagttggg gcctgttcag gcggcactgc atgccattga gacgattcat 5520
gaatccgcag tagtcgttgt gccgaaaggg cagcagcgca gcatcgtggc gttcatcgtc 5580
ctcaaagcgc cgagcgaaga tgaagcggtg cagcgcaata acatcaaaca acacttactc 5640
ggcgtactcc cctattacgc actaccggac aagtttattt ttgttaaagc actgccaaga 5700
aacacacatg gaaaaatcga cagaacgctg ctcttgcaac atgagcccca gactgagcaa 5760
gaaagcgcca tgcgagatgc gaccgacgtc gaacatcgca tcgccaactg ctggcaaacc 5820
atcatcggac accccgtcca actccacgaa aacttcctgg acattggcgg ccactcgctt 5880
tcgcttacgc atttaacggg cctactgaga aaagaattta atattcatat ttctctacac 5940
gacctctgga tcaggccaac catagaacaa caggccgact tcattcataa gttgcaaaat 6000
tcggtattga caaaacctgc cgccgcgcca atcccgcgac ttgaccgaaa gatctctcat 6060
cattaatcag gagtaccgca tgagcgtcga tacatgcagg actgcaactt tccctgcgtc 6120
atacggccag gaacagatct ggtttctgaa cgaactaaac ccgcactctc aactggctta 6180
taccctggcg atgaaagtat ctatcgccgg gaaattgaac acactgcggt tgcagcgtgc 6240
ggtcaaccaa gtggtggcct cccaggaaat tttgagaaca tcattcgcct ataaaaacca 6300
gaagttgagc caggtcattt caccctccgc gacactgccc attcgcagcg cgcactgcat 6360
tgacgatgta cctgggctgc aacgcctgat caacatggaa gcccagcgtg gctggtcgct 6420
gagcagcgcg ccactgtacc gcttgctgct gataaaaacc ggcgaccagc aacatgagct 6480
ggtcatctgc acccaccata tcgtctgcga tggcatctcg ctgcaactgc tgctgcaaaa 6540
aatagtcagc gcctatcaag gccaaagcga tgggcgggtg ctcacaagtc cggatgaaga 6600
gaccctgcaa ttcgtcgatt atgcggcctg gtcaaggcag cacgaatatg ccggtctcga 6660
gtactggcgc cagcaactgg ccgacgcccc gacaatcctg gatatttcga caaaaaccgg 6720
ccgaagtgag caacagacat ttctcggcgc gcgaattccc gtcgagttca gccaccacca 6780
atggcaagca ttgcgccaga tattcagacc ccagggtatc tcctgcgcgg cggtgttcct 6840
ggcggcctac tgcgtcgtcc tgcaccgcct ggccgagcag gacgacattc tgatcgggct 6900
gccaacttca aatcgcctgc gtccggagtt ggcacaggtg atcggctacc tgtccaatct 6960
gtgcgtgttt cgcagccagt atgctcacga ccagagcgtc acagactttc ttcaacaggt 7020
tcaattgacc ttacccaact tgatcgagca cggggagacg cctttccagc aagtactgga 7080
aagtgttgag catacccggc aagccggtgt gacgccgttg tgccaagtac tgtttggtta 7140
tgagcaggac gttcgacgca cgctggatat cggcgacctg caattgacgg tctcggatgt 7200
ggacacgggg gccgcacgcc tggatctatc gctgttcttg ttcgaggacc acgaactcaa 7260
cgtttgcggt tttctggaat atgccacgga ccgtatcgac gccgcatctg cgcaaaacat 7320
ggtgcgcatg ctcagcagcg tgctacgcga gttcgttgcg gcgccgcagg cgccgctcag 7380
cgaagtacag ctgggggcgg cggattccca agcccagaca cctgcgatcg caccagcatt 7440
cccaagcgtg ccggctcgtc tgttcgcctt ggcagacagt caccccaatg cgaccgcgct 7500
gcgtgacgag caaggtgaac tgacctatgc gcaagtttgc caacagattc tgcaggcagc 7560
ggccactctg cgagcccagg gggcgaaacc tggaaccctg atcgcggtca tcggcgagcg 7620
cggtaacccc tggttgatcg ccatgttggc gatctggcaa gtcggcggta tctatgtgcc 7680
attgtccaag gacctgcccg aacagcgcct gcaaggcatc ctggcggaac tcgaaggggc 7740
```

```
catactgatt accgacgaca ccacgccgga acgcttccgg caacgtgtga cgctgcccat 7800
gcacgcctta tgggccgatg gcgcaacgca tcacgagcgg cagacgacgg acgccagccg 7860
gctgtctggc tacatgatgt acacctcggg atcgaccggt aaaccgaaag gcgtgcatgt 7920
cagccaggcc aacctggtcg cgaccctgag cgcattcggc cagctgctgc aggtgaaacc 7980
cagcgatcgg atgctcgcac tgacgacctt ctccttcgac atttcgctgc tcgagctgct 8040
gcttcccctg gtccagggcg ccagcgtgca aatcgctgtc gcacaggctc aacgcgatgc 8100
ggaaaagctc gcgggctatc tcgcagaccc tcggatcacg cttgttcagg ccacaccggt 8160
gacctggaga ctattactgt cgacaggctg gcagccacgg gaaagcctga ccctgctgtg 8220
cggtggcgaa gcgctgccac aggatctggc ggacaggttg tgcttgccgg gcatgacctt 8280
gtggaacctc tacggcccca ccgaaacaac aatctggtcc acggcctgcc gcctgcaacc 8340
gggtgcgccg gtgcaactgg gccatcccat tgcaggtacg caaatagccc tggtggatcg 8400
gaacctgcgc agcgtgccca gaggggttat cggtgaactg ctgatttgcg gccccggcgt 8460
cagccagggc tactatcgca acccggttga aacagccaag cggttcgtac cggacccgca 8520
tggttcaggt aagcgcgcct atctgaccgg cgaccggatg cgcatgcagc aggatggttc 8580
gctggcctat atcggccgac gtgacgacca gatcaagctg cgcggccacc gtatcgagct 8640
gggagagatc gagacagcgt tgcgaaaact gcccggcgta cgggatgctg ccgcccaact 8700
ccatgaccag gacccaagtc gaggcataca ggcctttgtc cagctttgcg caacggtcga 8760
tgagagcctc atcgatatag gccagtggct ggaaacactg cgccaaacgc tgcctgaggc 8820
gtggctgcct actgagtatt acaggatcga tggcatccct cttacctaca acggcaaacg 8880
cgacaggaag cgcctcctgc accaggccgt caggctgcaa acactcagtc tgagggtggc 8940
tcccagcagt gacaccgaga cccgggtgca gcagatctgg tgcgagctgc tcggtctcga 9000
ggatatcggc gttacggatg atttttttcca gttaggcggc cactccattc tggtggcgcg 9060
catggtcgag cgcatcgaaa ccgcgtttgg acggcgcgta cctatcgcag atatctattt 9120
ttctccgacg atcgcccgtg tggcggcgac gctggactcc atgacatttg aacaaggact 9180
ggccgcacac agcgtgaaag gcgattggga gttcaccgcc atcagccttc aacacaacgc 9240
cgacagcaca gccgccgctc aggagagatg aatcatgcac agccccacta tcgatacttt 9300
cgaggccgca ctgcgctcat tgcccgctgc ccgcgacgca cttggtgcct atcccttgtc 9360
cagcgaacaa aagcgcctct ggttactggc ccaactggcg ggcacggcaa cgttgccggt 9420
aacggtgcgt tatgcattca ccggcacggt ggaccttgct gtcgtgcagc agaacctgag 9480
cgcgtggatc gcacacagcg agtccttacg cagccttttc gtcgaagtac tggaacgccc 9540
cgtcaggctt ctgatgccta cgggcctggt gaaactggag tacttcgatc gcccgccatc 9600
cgatgccgat atggccgagc tcataggcgc cgcctttgaa ctcgacaaag ggccgttgct 9660
gcgtgcgttc atcactcgaa ccgctgcaca acagcatgaa ttgcatctgg tcggccatcc 9720
tattgtcgtg gacgaacctt ccctgcagcg cattgcccaa accctcttcc agaccgaacc 9780
cgatcatcag taccccgccg tcggtgcgat cgccgaggta ttccagcgcg aacagacact 9840
ggcacaggat gcgcaaatca ccgaacaatg gcagcaatgg ggaataggcc ttcaggcgcc 9900
tgcggcaacc gaaattccga ccgaaaaccc ccgccccgct atcaagggct cagatcgtca 9960
agtacatgaa gcccttactg catggggcga ccaacccgta gcagaggccg aaattgtcag 10020
cagttggctg accgtgctga tgcgctggca gggatcgcaa tcggcgcttt gcgcaatcaa 10080
ggtgcgcgac aaggcgcatg ccaacttgat cggcccactg caaacctacc tgccggtccg 10140
cgttgatatg·ccggatggca gcaccctggc acaactgcga ctccaggtgg aggaacagct 10200
caatggcaac gaccatccgt ccttttccac gctgctggaa gtttgcccac caaagcggga 10260
cctgagtcgc accccctact tccaaaccgg cctgcagttc attgcgcacg atgttgaaca 10320
gcgcgacttc catgccggca acttgacacg cctgccaacg aagcagccaa gcagcgacct 10380
tgacctgttc atttcctgct gggtaagcga cggcacgctt ggcctgacgc tggattatga 10440
ttgcgccgtg ctgaattcga gccaggtcga ggttctggcc caggcgctca tcagcgtatt 10500
gtcagcgccc ggtgaacagc caatcgcaac cgttgcgctg atgggccagc aaatgcagca 10560
aaccgtcctg gctcaggccc acggcccccg cacgacgccg ccgcaactga cactgaccga 10620
atgggtcgcc gccagcacgg aaaaatcccc gctggcggtt gcggtgatcg accacggcca 10680
gcagctcagc tatgcagagt tatgggcaag agctgcactg gtagcggcga acatcagcca 10740
gcatgtggca aagcctcgga gcatcatcgc tgtagcactg cccagatcgg ctgaatttat 10800
tgcagcgctg ctgggggtag tgcgagcagg tcatgcgttc ttgcccatcg atccccgcct 10860
gcccaccgac cgcatccagt tcctgattga aaacagtggc tgtgagttgg tcattacctc 10920
tgatcagcaa tccgtggagg gttggccgca ggtcgccagg atacgaatgg aggcgcttga 10980
tccagacatt cgctgggtgg cgccgacggg gctcagccac agcgatgccg cctacctgat 11040
ctatacctcc ggcagcaccg gcgttccgaa gggagtcgtt gtcgagcacc ggcaagtagt 11100
gaataacatc ttgtggcggc aacgaacctg ccgctgacg gcacaggaca acgtgctgca 11160
taaccattcg ttcagcttcg atcccagcgt ctgggcgttg ttctggccgc tgctgaccgg 11220
```

```
tggcaccata gtgctggcgg atgtcagaac catggaggac agcaccgccc tcctcgacct 11280
gatgatccgc catgatgtca gcgttctggg tggcgtaccg agccttctcg gtacgctgat 11340
cgatcatcca ttcgccaatg attgccgggc ggtcaagctg gtgctcagtg gcggcgaagt 11400
cctcaacccc gaactggcac acaaaattca aaaggtctgg caggccgacg tcgccaacct 11460
ctatggccct accgaagcga ccatcgatgc gctgtatttt tcgatcgaca aaaatgctgc 11520
cggcgccatc ccgattggct atccaatcga caataccgac gcttatatcg tcgacctcaa 11580
tctcaaccca gtcccgccag gcgttccggg agaaatcatg cttgctggcc agaaccttgc 11640
gcgcggctat ttgggcaaac ctgcgcaaac cgcgcagcgc ttcctgccca acccatttgg 11700
caacggacgc gtgtatgcaa cgggcgatct gggacgacgc tggtcatcgg gggccatcag 11760
ctacctgggc cgacgcgacc aacaggtgaa gattcgcggg catcgcattg agcttaacga 11820
agtcgctcat ctgttgtgcc aggcgcttga gctgaaggaa gccatcgtct tcgcccagca 11880
cgctggaacc gaacaggcac gcctggtggc ggccatcgag caacagccag gcctgcacag 11940
tgaaggtatc aaacaggaat tgctgcgcca cttgccagcc tatctgatcc ctagccagct 12000
cctgctattg gatgaactgc caagaaccgc caccggcaag gtcgacatgc tcaagcttga 12060
tcagttggca gcccctcagc tcaatgacgc cggggcacg gaatgccgtg cgccacgtac 12120
cgaccttgaa caatcggtca tgacggattt cgcccaagta ctcggcctca ctgcggtaac 12180
gccggacacg gatttcttcg agcaaggcgg caactcgatt ctactcacgc gcctggcagg 12240
caccttgtct gccaaatacc aggtgcagat tccactgcat gagttttttcc tgactccgac 12300
cccggcagcg gtggcgcagg caattgaaat ctaccgtcgc gaaggcctca cggcactcct 12360
gtcacgccag catgcacaaa cgctggagca ggacatctac ctggaagaac acattcggcc 12420
ggatggctta ccacatgcca actggtacca gccttctgtc gtgtttctga ccggagccac 12480
cggctacctg ggactgtacc tgatcgaaca gttgctcaag cgcaccacca gccgcgtcat 12540
ctgcctgtgc cgtgcaaagg atgccgagca tgccaaggcc aggattctgg aaggcctgaa 12600
aacctaccgc atcgacgtag gcagcgaact gyaccgggtg gagtacctca cgggcgacct 12660
ggcgttgccg cacctgggcc tgagcgagca tcaatggcaa acgctggccg aagaggtcga 12720
tgtgatttat cacaacggcg ccttggtcaa ctttgtctac ccctacagcg cactcaaggc 12780
gaccaacgtg ggaggcacgc aggccattct ggaattggcc tgcaccgctc gactcaagag 12840
tgttcagtat gtctccaccg tggatacgct cctggcgacg catgtccccc gccttttat 12900
cgaggacgat gcccccctgc gttccgccgt cggcgtacca gtgggctaca caggcagcaa 12960
gtgggtggca gaaggggtgg ccaatcttgg cctgcgtcgc ggcattccgg tcagcatctt 13020
ccgcccgggc ttgatcctgg gccataccga aacgggtgcc tcgcagagca tcgactacct 13080
gctggtggcg ctacggggtt tcttgcccat gggcatcgtg ccggattacc cacgcatctt 13140
cgacatcgtg cccgtggact aygtcgccgc ggcgatcgtg cacatatcga tgcaaccgca 13200
gggcagggac aaattcttcc acctgttcaa cccggcgccg gtcaccatcc gccagttctg 13260
cgactggatt cgcgaattcg gttacgagtt caagttggtc gacttcgaac acggtcggca 13320
gcaggcattg agcgtaccgc ccgggcacct gctgtacccg ttggtccccc tgatcaggga 13380
tgccgatccg ctgccccacc gcgcgctgga ccctgactac atccatgaag tgaaccccgc 13440
actggaatgc aagcaaacct tagagctgct ggcctcctcg gacatcaccc tgtcgaaaac 13500
cacaaaggct tacgcgcaca caattttgcg ctacctgata gacaccggct tcatggccaa 13560
gcctggcgtg tagcggattg agcacaaaca ggacgaatat catggaatcg atagcctttc 13620
ccattgcaca taagcccttc atcctgggct gtccggaaaa cctgccggcc accgagcggg 13680
cgcttgcccc ttctgcggcg atggcgcggc aggttttgga gtacctcgaa gcgtgccccc 13740
aggcgaaaaa cctcgagcag tacctcggga cgctgcgtga agtcctggcg cacctgcctt 13800
gtgcttccac cggactgatg accgatgatc cacgggaaaa ccaggaaaac cgcgacaacg 13860
atttcgcctt cggtattgaa cgacaccagg gcgacactgt gaccctgatg gtcaaggcca 13920
cccttgatgc agcgattcaa acgggcgagt tggtccaacg cagcggcact agcctggatc 13980
actcggagtg gagcgacatg atgtcagtcg cacaggtgat tctgcagacg attgccgacc 14040
ctcgggttat gcccgaatcc cgtttgacgt tccaggcacc gaaaagcaag gtcgaagaag 14100
atgaccagga cccgctgcga cgctgggtgc gtggccacct gctgttcatg gtcctgtgcc 14160
aaggcatgag cctgtgtacc aacctcctga tcagcgcggc ccacgacaag gacctcgaac 14220
tggcgtgtgc acaggccaat cgcctgattc aactgatgaa catctcgcgc atcacgcttg 14280
agtttgcaac cgacctgaac tcacaacagt acgtcagcca gattcgcccg acgctcatgc 14340
cgscgatcgc gccgcccaag atgagtggca tcaactggcg tgaccatgtg gtgatgattc 14400
gttggatgcg ccagtccacc gatgcctgga acttcattga gcaggcctac cctcaactgg 14460
ctgaacgtat gcgaaccaca ttggcgcagg tctacagcgc tcatcggggg gtctgcgaaa 14520
agttcgtagg cgaagaaaac accagtttgt tggccaagga aaacgccact aatacggccg 14580
gccaggtgtt ggaaaacctg aagaaatcga gattgaaata cctcaagaca aaaggttgcg 14640
ccggtgcggg ataagccctg actgcgcctc gcccccatca aaaccggact gatattcggg 14700
```

```
aaaacaaagg agagaagcat gccgacattt ctgggagacg acgacgcagt gccatgcgtg 14760
gtcgtcgtta acgccgacaa acactattcg atttggccaa gcgcgagaga cattccatca 14820
ggttggtccg aagaaggatt caaggggtca cgttcagact gcttggaaca tatcgcgcaa 14880
atctggccag agccgacggc atagatacaa cgtgatgcaa aaaatgcggg aaacatcaac 14940
taaccaaagc aaggaagaaa aatgacttca actcatcgca ccactgatca agtcaagcct 15000
gctgttctgg atatgccagg cctgtcgggc attcttttcg gccacgccgc attccaatac 15060
ctgcgggcca gctgcgaatt ggatctgttc gagcatgtcc gcgacctgcg cgaagccacc 15120
aaggagagca tcagcagccg actgaagttg caggaacgcg ccgccgatat tctgctgctg 15180
ggcgcgacct ccctgggcat gctggtcaag gaaaacggca tctaccgcaa tgccgatgtg 15240
gttgaggatt tgatggccac ggacgactgg caacgtttca aggataccgt ggcctttgaa 15300
aactatatcg tctatgaagg gcagctggac tttaccgagt ccctgcagaa aaacactaac 15360
gtcggccttc agcgtttccc gggcgaaggg cgggacctct atcaccgcct gcaccagaat 15420
cctaagctgg aaaacgtgtt ctaccgctac atgcgctcgt ggtctgaact ggccaaccag 15480
gacctggtca agcacctcga cctgtcgcgc gtgaaaaaat tgctcgacgc gggtggcggt 15540
gatgcggtca acgccatcgc cctggccaaa cacaatgagc aactgaacgt aacggtactg 15600
gatatcgaca actccattcc ggtcactcag ggcaaaatca atgattccgg gctcagccac 15660
cgggtgaaag cccaggcatt ggatatcctg caccaatcct tccctgaagg ttacgactgc 15720
attctcttcg cccaccaatt ggtgatatgg accctcgaag aaaacaccca catgctgcgc 15780
aaggcctacg atgcgctacc agaaggcgga cgcgtggtca tcttcaactc catgtccaac 15840
gatgaaggcg acggcccggt catggccgca ctggacagcg tctactttgc ctgtctaccc 15900
gccgagggcg gcatgatcta ttcctggaaa cagtatgagg tctgcctggc ggaagccggc 15960
ttcaaaaacc ccgtacgcac cgcgattcca ggctggaccc cacacggcat catcgtggcc 16020
tacaagtaat tttgcctcct ccgcccctac tggggccgga ggagtcattt caacatttgc 16080
gtcattgacg ccacctggcg atagggacac ccacatggca cgttcacccg agacaaatag 16140
tgcgatgccg caacagataa gacagctttt atacagccaa ctgatttcgc aatcgattca 16200
aaccttctgt gaactgcgcc tgcctgatgt tctgcaagca gctggccagc ctacctccat 16260
cgaacggctt gctgagcaga cacacactca tatcagcgcc ctgtcacgct tgttgaaagc 16320
gttgaaacca ttcgggctag tgaaagaaac cgacgaaggt tttccttga ccgatctcgg 16380
cgccagtctg acccacgacg cctttgcttc cgctcaaccc agtgctttgt tgatcaatgg 16440
tgaaatgggc caagcctggc gtggcatggc gcagacaatc cgaaccggtg aatccagctt 16500
caagatgtac tatggcatca gcctgttcga gtattttgaa cagcacccgg aacgccgggc 16560
cattttltgac cgttcccaag acatgggact ggacctggag atcccggaaa tcctggagaa 16620
catcaacctg aatgacggtg agaacattgt cgatgtaggg ggtggttcag ggcatttgct 16680
gatgcacatg ctggacaagt ggccagaaag cacaggcata cttttcgact tacccgtcgc 16740
ggcaaaaatc gcgcagcaac atctgcacaa atctggaaaa gcaggctgct ttgaaatcgt 16800
cgcaggggat tttttcaaga gcctgccgga cagtggcagc gtttacttgc tgtcccatgt 16860
cttgcacgac tggggcgacg aagactgcaa ggccattttg gccacctgcc ggcggagcat 16920
gccggacaat gcgctgttgg ttgtagtgga cttggtgatt gaccagagtg aaagtgccca 16980
gcccaacccc acgggcgcaa tgatggatct ttacatgctg tccttgttcg gtatcgccgg 17040
aggcaaagag cgcaacgagg atgaattcag aaccctcatt gaaaacagcg gcttcaacgt 17100
caaacaggtg aagcgcctgc caagtggaaa cggcatcatc ttcgcctacc caaaataaat 17160
gatcctcatt gcccctcgcc actttccagg ggggctattt tattctcggg tgattccccc 17220
cctaatgatt acaaggaaga cacatgtcga cgctggttta ctacgtagca gcaaccctgg 17280
atggttatat cgccactcaa caacacaaac tggattggct ggagaacttt gccctggggg 17340
atgacgcaac ggcctatgay gatttttatc agacgatcgg agcagtggtc atgggatcgc 17400
agacctatga atggatcatg tcgaacgctc ccgatgactg gccctaccag gacgtacccg 17460
cctttgtcat gagcaaccgg gatctgtcag ccccccgccaa tttggatatc accttcttac 17520
gcggcgatgc cagtgccatc gcggtcaggg ccaggcaagc ggcgaagggc aagaatgtct 17580
ggctggtcgg tggcggcaaa acggcggcct gttttgccaa cgcaggggaa ttacagcagc 17640
tgttcatcac cactattcca acctttatcg gcaccggcgt tccggtactg cccgtagacc 17700
gcgcgcttga agtggttctc agagaacaac gcacgctgca gagcggtgcc atggaatgca 17760
tcctggacgt gaaaaaagcg gattaacgtc tacaagacaa tcgtgtatcg aaactcgcaa 17820
cgtccaaacc caagggaaaa accagtgaag cgattggtat tgagtttatg tttgttggct 17880
gttatcgctc tcgccagtgt tcaaggaata aggatggtga aacccgccgc cctgacagcc 17940
gccgatgctc gcgatatcgg ctatctgaat gtacgcgata gcctttccgt cattgccgcc 18000
gcccccacc ccaccgcctc acctcgccag gccgttgtca ggcattattt gcgggaaacg 18060
attgcgggca tgggttacca ggtggttgag caaccctttc tatttaccat cgagagcatg 18120
gtgaaccggc agaaaaccct ctatgccgag ttgaacgagc agcagcgcca agcgttcgat 18180
```

```
gctgagctgg cccgggtggg cgcggacagt tttgaaaaag aagtgcggat tcgctccggc 18240
ctactggaag gcgacagcgg ccagggaacc aacttgatag cctcacaccg cgtaccggga 18300
gcgaccgcga cggtcctgtt catggcgcat tacgacagcg tcggcaccgc tcccggtgcc 18360
agtgacgatg gcatggccgt cgcctcgata ctccaactga tgcgggaaac cataacccgc 18420
agcgatgcca aaaataacgt tgtctttcta ctcrccgatg gcgaagaact gggcttgctc 18480
ggagcggagc actacgtctc gcagctcagt acgcctgaac gtgaagccat ccgcctggtg 18540
ttgaactttg aagcccgggg taaccagggc atccctttac tgttsgagac atcccagaag 18600
gactacgccc tgatcaggac tgttaacgca ggggttcggg acatcatatc cttctcattc 18660
acgcccttga tttacaatat gctacaaaac gacaccgact ttacggtgtt caggaaaaag 18720
aacatsgcgg ggttgaattt tgcagtcgtg gagggttttc agcactacca ccacatgags 18780
gacaccgtgg agaaccttgs gccagagacc ttgtttcgct accaaaagac agtgcgtgaa 18840
gtgggcaacc actttatcca gggtatcgac ctctcctccc tgagtgctga tgaggacgca 18900
acctatttcc cactgccagg cggcacgctg ttggtactca acttacccac cctgtatgcg 18960
ctgggcatgg gctcgttcgt gctctgcggt ctttgggcgc aacgctgccg cactcgccga 19020
cagcatcagg gcaagaattg cgtactgcgc cccatggcta ttgccctgct cggcattgcc 19080
tgcgcagcac ttgtattcta cgtcccgagc attgcctatc tattcgtcat ccccagtctg 19140
cttctggctt gcgccatgtt gtcgcgaagc ctctttatct cctattcgat catgctgctg 19200
ggcgcttatg cctgcgggat actctacgcg cctatcgtct acctgatttc atcaggcctt 19260
aaaatgccgt tcattgccgg ggtcattgca ctactcccgc tctgcctgct ggccgtggga 19320
ctggccggcg tcatcgcacg atcgagagac tgtcgaacct gcgactagca agacccgata 19380
aaacgtcgct tcaaacgcca gatgacgtgc ctcgtcagcc aggcgtggaa ccatctggtg 19440
gcggcaaatg tgcataaggt gggaacgcag agcgcccgct gcaacacgcc caccccaagc 19500
accgcgcctc aacggataat caggctcaag ggaattccac cttgcaacct gaaagagcaa 19560
tcgagcgccc gtcggacaca acaaactgat caccgtcaat tcgggcaagg agcaatccac 19620
gggcttttgc tccaacctca actccctttg aaaaatcagc cggccacaat ttgcccctac 19680
cctttcagga tatcctcgat aagcgtttta tcagaacagc gaaaaaccac ttcaagttcg 19740
tgtacttttt actgcgatct gcgatcgctc ccatggtaca araatgacag atgggaagat 19800
cgctttaata cctactctct cacctgagaa aaagtaacca ccgggccgta ttcctgatca 19860
gacactatcg cctgcacaca aaatttcttc tctggaaact tactcagcaa caccatcctc 19920
catgactgag caataaggtt gcacagttgt tcataaacag cttcatcgac tctatcgctg 19980
cagcctgcaa aaacatcata caggtgcaca tgattcaaaa ccttctcaac cgccaccaca 20040
tcacgattac aagactgcat ccaactggag aatgcttcaa cagtaaatcc gctttccaga 20100
aacacgcccg actcgtaaac aacaaagtct ggaaacaaca cggtggaaaa caccaggaca 20160
tcttcaggat gtacaacatc actaataaaa caagactcaa ccaactcgga ttgatccttc 20220
cattgggact tccagcgctc gtatttggga gacctgacag ggtctgtcgt cctgattatt 20280
ttcatagcac tgttcctgca ctgatgcctt ttggcgattt tttgtttgag cgagaatcga 20340
tcgatggctc attgttcatc aagaaaaaaa ttctctcgaa acagactctt aagctcggcc 20400
cggcgcgttg agaacagtga aaagtcactc gccacatcct gaatattctc tgtgaccctc 20460
acaagatacc cagtattcag cttttcaatg ggaaagcctg acgcagcaat ccgctcaaca 20520
tcgacctctt cagcaaactc atcgccgtag aacatagccc aaccgatatt gggcacgtcc 20580
ggtttcaaag ccgaattgaa tgagccgatc tgaaaacttt tatatttctc atgcgggcta 20640
agttcgggtt cactgaacag gtgcagcatt ccgagttgag gaggaaaaat ttcacaccat 20700
gccttgaaga gcgaatacca atcgacgctc ttgctactga ccgagcggta tgtgattgcg 20760
ccaggaacca cctgcccccg gacattgcgc gccgtgtgga tgacgctccc acagccttta 20820
accgcctttt ttctgcgcca ggcaaagtcc aggtagaagt ccgataatgc gccgttaaac 20880
cgtatggccg cctttgatgc ccagcacgct tcactcgcgg ccacgcccat gaaaggctct 20940
ccgaatttat ccgcattgtg cgacacctgc tctggaacca gtaactcccc ttcccgactt 21000
aatgacgaaa tgaacgcctc tccaacaccc caaccgatag tttcagactt cgtcctgatt 21060
gtaatttgca catagggctt cataaatcgt caaagtctcg tcaattcacg ggtgacacaa 21120
gtatatccaa agagctctcc acgttactca tcgcatcgag tctatcaacc aaccaacgcc 21180
gcctcacgcg ccaccgccca cggcgccatc aaccgctgcg gggtctggca ggttttgcgc 21240
ttgagcacga aattgcggca tttctcggcg aattggtggc ggttgtgcac catgtccaac 21300
tgcatctgcg ccagctcggc ttcacggcag cgtgtaatct ggtcgatgtc caacgccgct 21360
ttacgggcgc gagccacggc gtacttttca tcggttaacg cgctgcttgc ctgctgcatc 21420
agccaacggc tgaaggcgtg cgggcagcgc gggccgatgc cctgaaccag cccgtattgc 21480
tcggcttgca aggcactgat cggcaggcag gcgtcggtga gttgatgggc gacttcactg 21540
ccaacggcgc gtggcaggct gtaggtccag tattcggagc cgtacaggcc catggttttg 21600
taatgcgggt tgagtaccac gctctcgcgg gccaatacga tgtctgcggc cagcgccagc 21660
```

```
attacaccac cggcgccggc gctgccggtc aggccgctga tcaccagttg ccgggccgtg 21720
agcagttcgt ggcacacatc gtacgatggc ctgaatgttg gcccaggctt ccagccccgg 21780
cactggggcg gcctggatga cgttgaggtg cacaccattg gaaaagctgc cgcgcccgcc 21840
cttgatcacc agcacttggg tgtcccgcgt cttggcccag cgcaacgccg ccaccagtcg 21900
ctggcactgc tcggtgctca tggcgccgtt gtagaactca aaggtgagtt caccgacatg 21960
gccggcttcg cgatagcgaa tcggttgata ggcttgctca tcgaacattt gattggcgat 22020
cgagctgtcc agcacgggaa tatccgccag tgcttccgcc agcacgtggc gggccggcag 22080
cttgaaggtc tcctcccccg gccgggcttt gcgtttgagc gagccgatcc acaggctctg 22140
atcaccggcc gccaccagca ccgcgtcgtc ctgcaccgcg aggatctcac ccggtgtgcc 22200
gtggcgcgca tccaggtgcg cgtcgtacag gtaatactgc ccgccctgga tactggccag 22260
cacaccgggc tggccatcgg ctgcgtcgat gcagcgtttg atgaagcgtg cgcaatcgta 22320
ccaactgaag gtgcgatcag cctgtgtcat gttcggctgc aaacgcccga ttacgtgggc 22380
ttgggtgtaa tcgagcggca ccgggacgaa aacccgggcg aactttttcca ccacgtcgcg 22440
gatgcaatag agggcggcgt cactcaccgc gccgttgtac agctcggatt tgcgcacatc 22500
ggcaggcatg tcgaattcac aggtcgacca gatcggcccg gctccatttc ctccaccgcc 22560
tgcaaagccg tgacgccccca gcggccgacc tgctggctga tggcccagtc cagcgcgctg 22620
gcaccacggt cgccgacgat gcccggatgg ataatcacca cagggcgctc aaggttgctc 22680
caaagttgct gtggcacacg gtctttcaga aaggggcaga tcaccaggtc ggcgtctgaa 22740
tcctcgatct gctggcacac caaggctgga tcggtgaaca gaacaacgct gggcgcgtgc 22800
cccgactggc gtaaatccag ccaggcccgc tgggtcaaac cgttgaacgc cgacgctaac 22860
acgatgatct tcaatgaccg catggctgac tcatccttga gaatgcgcgg ccagaggtgc 22920
tccttgagcc ctccctggcc tttgatggaa gtacaaggat agttggcgtg ccaggcaggc 22980
tacctgatca ggatcaatct tgtgtcagcg agtgcttgaa cgtaggcgcc tgcgttcaac 23040
caataggcgc atggsctggc gagtgctccc gcgtgccctc tgccacaagg gacgccaggt 23100
attcgccaaa cccgccgcga cacttgtagt cccgacgcgc actggtgacc acgggattgg 23160
tcgccgtcca cacgatccgc gcgccaatcc tctcgaggtc ggccaccaac tgcacatctt 23220
catgggcaac caaatgctgg aacccacccg cgtttcgata ggcatccgca ctcaagccca 23280
ggttggcacc gtgtatatgg cggtggttct cggtgaactg atacaactca aggtagcgcg 23340
aacgaaccga ttcaccgtac tcgctccagc tgtccacctc gacggttccg cacaccgcat 23400
cggcgccaaa gccgatctga cgcaccagcc agtcgrcggg cacaactgtg tcagcgtcgg 23460
tgaatgccag ccactgggcg ccgacttcaa gcaatcgctc cgcgcccaag gccctggcct 23520
tgcccacatt tcgaacgctc acctcaagcg tkgcgacacc catggccgac acgcgcgtgg 23580
cggtctcgtc cgaacacgca tccagcacca ccagcaattg gacctgttgg tgtgccagag 23640
ccggatgagc aatggcgcgc tggatggagg cgaggcaggc actgatgtgc cgttcttcgt 23700
tatgggcagg tatcactatc cctatcattg acgttccctc taccaggcaa agtgtctaca 23760
gctatcgacc gggccgtgag gcagaaggtt taaacaatct gaaggcgccg ccaaacaatg 23820
acgtgagaca ggtcgcagtg attaaacgga acgtcacagg cgccacaggc tcagatggtt 23880
tacgtgtttg atgcacggat gaacccgcca ttcctacaaa caggtcagcc atcatgtcta 23940
acgattatca aggtatcgcc agtgtcatca cggcttctcg tcacatgggt acagactcgg 24000
atgaacgcct taatgagacg gtaaatattc aattgacctg cagcggtaaa ccaacgattg 24060
cgcggttgag tttcgacacc ccgcttcaat ggcccggcca ccccaacttt gtgctgatca 24120
acctgccgga cggttcatcg gtgggtggtg tgattgccga aattgaaaag tcgaccgatg 24180
gcccgggttg ggtgacgttt acggtggatg actgaggtct tcccaacagg cttcaaatca 24240
cctccaggcg gctgcctcga atgagacaca caggccagta atcgagacgc acagacaagc 24300
ctatttttcgc agatacattt tgtaacgtcc tatgattgac gcttgctcga atcaccgcga 24360
gggattgggt ggcgtgtgtt tatcacgccc ttgaatccgc agcgaaaat gattcgagtt 24420
cagcgaacaa ttcgattggg acaaacaaaa ggatgcgggc tatgtcattg cgtaatttat 24480
ctttattggt caccacactg gcgctgttta agtggggtgt aatgcgctcg cggggcaaaa 24540
cccaacatgc tcagtgatga tgacgtgaaa tcccaaagcg ccggcgcact gggctatgcc 24600
ccgacagacc tgagcatcgt caaccgtcga accgaaggca ccaacaccta cgtgctgctt 24660
aaaaccaacg acaacaagca gttcaactgc attatcaacg gaggcaatat cctgaccttc 24720
ggtatgtcca acccgccttc gtgtgcgaag aaaggtgaac agatcaagag tggcccgttc 24780
gggagctgat ctgtcgctgg aaaaaagggc caggccacct ctaagaacgg aggcctggcc 24840
ctttttttatt cgctcagatg agtttaaaag acaagatatc gggcagctgg gctccggccc 24900
gttcagtctg ggcacccccac acaaaaatgct cagcgactac ttggccgtcg ccgcacaccg 24960
gtttaacggg tgcgacctac agcgtcrccc tggttgaagg cagcaacgaa taaaccctat 25020
tgatcggaga gcgaccatgc acccgcataa aaccgcgatt gtcttgattg aataccagaa 25080
cgacttcacc acccccggcg gcgtgttcca tgacgctgtg aaagacgtca tgcaaacgtc 25140
```

```
caacatgctg gcgaataccg ccaccacgat tgagcaggcc cgcaagctgg gcgtgaagat 25200
catccactta cccatccgct ttgccgacgg ctacccagag ctgaccctgc gctcatacgg 25260
cattctcaaa ggcgtcgccg acggcagcgc gtttcgtgcc ggcagctggg gcgccgagat 25320
caccgacgcg ctgaaacgcg accccaccga tattgtgatc gaaggcaaac gcggcctgga 25380
tgctttcgcc accaccgggc tggacctggt gctgcgcaac aatggcatcc agaacctggt 25440
tgtcgcaggt ttcctgacta actgctgcgt tgaaggcacg gttcgatccg gttacgagaa 25500
aggttatgac gtggtgacct tgaccgactg caccgcgaca ttcagtgatg aacaacagcg 25560
cgcagccgag cagtttacgt tgccgatgtt tttcgcaaac cctgcaacac accgcgtttc 25620
tgcaagcact gaacgccgga taaaaaaagc ggcggactcc tgccgagtcg ccgctttttt 25680
agtgcttggg tcattcggtt ggcgcgtact gcatttcgcc gttcccaaac gaccagtctt 25740
cgcgcttcac gtccaccagg ctgatccaca cgtcttcctt gcgcagcccg gtcttggcat 25800
ggatgccgtc ggcgatgaac ttatagaaag ccttttttcac gtcaatgctg cgcccggcgt 25860
tccacgtgac ttggataaac acgatcttgg gtgtgtaagt gacgccaaga tacccggccg 25920
ccgggtaaac cagctcatcc ttggcatggc ggttgatgat ctggaatttg tcgtgctcag 25980
gcacgttggc ccacactggt catcgcggcg tacacgacat caccgatggc cgtcgcggtt 26040
tcagtggaag tgtcggcggc gaggtcgatt cgaactaaag gcatggacaa atccttagtg 26100
attttcagct gaaaatgggc gtgtggctca cacactcgcg ccaaccgggc aacttgcgcc 26160
aggccaacga gttgctggcc cagggagttg ccgacggttt cgctagtgc gccgcgaaac 26220
ttcggcattt gacgcatcgg tgaatggctg accggatgtc agtgcttatt gacctgaata 26280
tagactgccg tgcacagacc aatcaaacaa ataccggcga tgtagtaagc ggcgcccatc 26340
tgactgtatt gaagcaatag agtaacgacc atcggcgtca ggccaccgaa tacggcgtac 26400
gacaagttgt aggaaaatga caagccggaa aaccgcacta ccggtggaaa ggcacgcacc 26460
atcacagcag gggctgcgcc tatcgcgccg acaaaaaaac cggtaagtga atagagtgga 26520
accagccatt gcgggtgcgt ttcaagcgtc ttgaacaaga gcagtgcgct gaacagaagc 26580
atgacgctgc cgatcatcaa tacccarccc gcactgaaat gatcggccag tttcccggcg 26640
atcacgcaac caacactcaa rrcacrcaat agcgagactg ttggcctgca aggcttgcgc 26700
tgcag                                                              26705
```

<210> 2
<211> 1004
<212> PRT
<213> Pseudomonas fluorescens A2-2

<400> 2

```
Met Leu Leu Glu Val Ala Phe His Val Ile Thr His Leu Ser Thr Ser
 1               5                  10                  15

Gln Leu Val Ser Arg Ile Glu Arg Val Val Glu Arg His Ala Ser Leu
            20                  25                  30

Arg Gln Arg Phe Val Met Arg Asn Gly Thr Tyr Trp Ile Glu Gln Ala
        35                  40                  45

Pro Pro Gln Gln Arg Arg Tyr Cys Val Val Arg Thr Tyr Asp Glu Ala
    50                  55                  60

Ser Thr Asp Ala Leu Leu Ala Pro Ser Arg Glu His Ile Gly Val Glu
65                  70                  75                  80

Ser Glu Arg Leu Phe Arg Ala Glu Val Val Glu Arg Ser Asp Gly Gln
                85                  90                  95

Arg Tyr Leu Val Phe Arg Ile His His Ile Ile Ala Asp Leu Trp Ser
            100                 105                 110

Val Gly Leu Leu Ile Arg Asp Phe Ala Glu Asp Cys Met Asp Arg Ser
        115                 120                 125
```

Ser Ile Thr Leu Ala Ser Arg Pro Ile Ala Pro Leu Ile Asp Pro Glu
    130   135   140

Phe Trp Arg His Gln Met Ser Gln Asp Thr Pro Phe Ser Leu Pro Met
145   150   155   160

Ala Ser Leu Glu Gln His Thr Asp Arg Arg Met Val Leu Ser Ser Phe
            165   170   175

Val Ile Asp Gln Glu Ser Ser Ala Asp Leu Ala Arg Leu Ala Thr Ala
            180   185   190

Cys Ala Val Thr Pro Tyr Thr Val Met Leu Ala Ala Gln Val Leu Ala
        195   200   205

Leu Ser Arg Ile Gly Gln Ser Gly Arg Leu Ser Leu Ala Val Thr Phe
    210   215   220

His Gly Arg Asn Arg Gly Asn Lys Asp Ala Val Gly Tyr Phe Ala Asn
225   230   235   240

Thr Leu Ala Val Pro Phe Asp Val Ser Glu Cys Ser Val Gly Glu Phe
            245   250   255

Val Lys Arg Thr Ala Lys Arg Leu Asp Glu Ala Ser Lys Ala Ser Val
            260   265   270

Gly Ala Gly Tyr Pro Glu Leu Ala Glu Phe Met Thr Pro Leu Gly Trp
        275   280   285

Ala Ala Thr Ala Pro Thr Asn Ala Val Ile Tyr Gln Gln Asp Met Pro
    290   295   300

Gly Met Pro Arg Gly Leu Ala Ala Ala Leu Leu Gly Leu Gly Thr Val
305   310   315   320

Gln Leu Gly Glu Met Ala Leu Thr Ala Glu Gln Ala Pro Pro Ser Ile
            325   330   335

Gly Pro Phe Ala Thr Ala Leu Leu Leu Thr Arg His Asp Gly Lys Leu
        340   345   350

His Gly Arg Val Glu Val Asp Pro Ala Gln His Pro Gly Trp Leu Ala
        355   360   365

Glu Ala Leu Ala Arg Gln Phe Ala Val Ile Leu Arg Glu Met Val Arg
    370   375   380

Asp Pro Gln Ala Arg Leu Ser Ala Leu Pro Ala Cys Leu Leu His Gln
385   390   395   400

Pro Lys Tyr Pro Ser Gln Ala Arg Pro Ala Pro Ala Ser Glu Thr Leu
            405   410   415

Val Ala Thr Phe Leu Arg Gln Val Ala Ile Thr Pro Asp Lys Pro Ala
            420   425   430

```
Leu Arg Thr Pro Gln Ala Ser Ile Ser Tyr Ser Glu Leu Ala Ser Arg
        435             440             445

Val Ala Arg Leu Ser Ala Ala Leu Arg Val Arg Gly Phe Lys Pro Glu
    450             455             460

Gln Thr Leu Ala Ile Leu Leu Pro Arg Asp Ile Asn Leu Val Pro Ala
465             470             475             480

Leu Leu Ala Ile Met Ala Cys Gly Gly Ser Tyr Val Pro Leu Ser Asp
            485             490             495

Ala Asn Pro Ala Glu Leu Asn Arg Ser Ile Leu Thr Arg Ala Arg Cys
        500             505             510

Arg Ala Ile Leu Thr Asp Gln Glu Gly Leu Thr Arg Phe Ala His Leu
        515             520             525

Ala Pro Cys Trp Ser Leu Ser Asp Leu Leu Ser Met Pro Asp Ala Pro
        530             535             540

Leu Gln Asp Gln Ser Lys Leu Gln Ala Lys Ala Tyr Ile Leu Phe Thr
545             550             555             560

Ser Gly Ser Thr Gly Glu Pro Lys Gly Val Ala Ile Thr His Ala Asn
            565             570             575

Ala Ala Asn Leu Leu Arg Trp Ala Ala Leu Asp Cys Gly Pro Glu Tyr
            580             585             590

Leu Ala Gln Thr Leu Ala Ala Thr Pro Thr Thr Phe Asp Leu Ser Ile
        595             600             605

Phe Glu Met Phe Ala Pro Leu Met Val Gly Gly Cys Val Gln Pro Val
        610             615             620

Ser Ser Val Met Ala Leu Ile Asp Asn Pro Ala Leu Leu Lys Gly Thr
625             630             635             640

Thr Leu Ile Asn Thr Val Pro Ser Val Ala Asp Ala Leu Leu Gln His
            645             650             655

Asp Val Leu Val Pro Ser Leu Arg Met Leu Asn Leu Ala Gly Glu Pro
            660             665             670

Leu Asn Arg Asp Leu Tyr Leu Arg Leu Gln Ala Lys Leu Thr Ala Thr
        675             680             685

Arg Ile Val Asn Leu Tyr Gly Pro Thr Glu Thr Thr Thr Tyr Ser Thr
        690             695             700

Ala Leu Val Ile Glu Pro Ala Gln Gln Glu Ile Thr Ile Gly Phe Pro
705             710             715             720

Leu Tyr Gly Thr Trp Val Asp Val Val Asp Gln Asn Met Gln Ser Val
            725             730             735
```

```
Gly Ile Gly Val Pro Gly Glu Leu Ile Ile His Gly His Gly Val Ala
            740                 745             750

Gln Gly Tyr Val Ser Asp Pro Val Arg Ser Ala Ala Ser Phe Leu Pro
            755                 760             765

Ala Ser Asp Gly Leu Arg Cys Tyr Arg Thr Gly Asp Arg Val Arg Trp
    770                 775             780

Leu Pro Asp Gly Arg Leu Asp Phe Ile Gly Arg Glu Asp Asp Gln Val
785                 790             795                 800

Lys Val Arg Gly Phe Arg Val Glu Leu Gly Pro Val Gln Ala Ala Leu
            805                 810             815

His Ala Ile Glu Thr Ile His Glu Ser Ala Val Val Val Val Pro Lys
            820                 825             830

Gly Gln Gln Arg Ser Ile Val Ala Phe Ile Val Leu Lys Ala Pro Ser
            835                 840             845

Glu Asp Glu Ala Val Gln Arg Asn Asn Ile Lys Gln His Leu Leu Gly
    850                 855             860

Val Leu Pro Tyr Tyr Ala Leu Pro Asp Lys Phe Ile Phe Val Lys Ala
865                 870             875                 880

Leu Pro Arg Asn Thr His Gly Lys Ile Asp Arg Thr Leu Leu Leu Gln
            885                 890             895

His Glu Pro Gln Thr Glu Gln Glu Ser Ala Met Arg Asp Ala Thr Asp
            900                 905             910

Val Glu His Arg Ile Ala Asn Cys Trp Gln Thr Ile Ile Gly His Pro
            915                 920             925

Val Gln Leu His Glu Asn Phe Leu Asp Ile Gly Gly His Ser Leu Ser
            930                 935             940

Leu Thr His Leu Thr Gly Leu Leu Arg Lys Glu Phe Asn Ile His Ile
945                 950             955                 960

Ser Leu His Asp Leu Trp Ile Arg Pro Thr Ile Glu Gln Gln Ala Asp
                965             970             975

Phe Ile His Lys Leu Gln Asn Ser Val Leu Thr Lys Pro Ala Ala Ala
            980                 985             990

Pro Ile Pro Arg Leu Asp Arg Lys Ile Ser His His
            995                 1000
```

<400> 3

Met Ser Val Asp Thr Cys Arg Thr Ala Thr Phe Pro Ala Ser Tyr Gly
 1   5   10   15

Gln Glu Gln Ile Trp Phe Leu Asn Glu Leu Asn Pro His Ser Gln Leu
            20   25   30

Ala Tyr Thr Leu Ala Met Lys Val Ser Ile Ala Gly Lys Leu Asn Thr
        35   40   45

Leu Arg Leu Gln Arg Ala Val Asn Gln Val Val Ala Ser Gln Glu Ile
    50   55   60

Leu Arg Thr Ser Phe Ala Tyr Lys Asn Gln Lys Leu Ser Gln Val Ile
65   70   75   80

Ser Pro Ser Ala Thr Leu Pro Ile Arg Ser Ala His Cys Ile Asp Asp
            85   90   95

Val Pro Gly Leu Gln Arg Leu Ile Asn Met Glu Ala Gln Arg Gly Trp
            100   105   110

Ser Leu Ser Ser Ala Pro Leu Tyr Arg Leu Leu Leu Ile Lys Thr Gly
        115   120   125

Asp Gln Gln His Glu Leu Val Ile Cys Thr His His Ile Val Cys Asp
    130   135   140

Gly Ile Ser Leu Gln Leu Leu Leu Gln Lys Ile Val Ser Ala Tyr Gln
145   150   155   160

Gly Gln Ser Asp Gly Arg Val Leu Thr Ser Pro Asp Glu Glu Thr Leu
            165   170   175

Gln Phe Val Asp Tyr Ala Ala Trp Ser Arg Gln His Glu Tyr Ala Gly
        180   185   190

Leu Glu Tyr Trp Arg Gln Gln Leu Ala Asp Ala Pro Thr Ile Leu Asp
        195   200   205

Ile Ser Thr Lys Thr Gly Arg Ser Glu Gln Gln Thr Phe Leu Gly Ala
    210   215   220

Arg Ile Pro Val Glu Phe Ser His His Gln Trp Gln Ala Leu Arg Gln
225   230   235   240

Ile Phe Arg Pro Gln Gly Ile Ser Cys Ala Ala Val Phe Leu Ala Ala
            245   250   255

Tyr Cys Val Val Leu His Arg Leu Ala Glu Gln Asp Asp Ile Leu Ile
            260   265   270

Gly Leu Pro Thr Ser Asn Arg Leu Arg Pro Glu Leu Ala Gln Val Ile
        275   280   285

Gly Tyr Leu Ser Asn Leu Cys Val Phe Arg Ser Gln Tyr Ala His Asp
        290   295   300

Gln Ser Val Thr Asp Phe Leu Gln Gln Val Gln Leu Thr Leu Pro Asn
305   310   315   320

Leu Ile Glu His Gly Glu Thr Pro Phe Gln Gln Val Leu Glu Ser Val
            325   330   335

Glu His Thr Arg Gln Ala Gly Val Thr Pro Leu Cys Gln Val Leu Phe
            340   345   350

Gly·Tyr Glu Gln Asp Val Arg Arg Thr Leu Asp Ile Gly Asp Leu Gln
        355   360   365

Leu Thr Val Ser Asp Val Asp Thr Gly Ala Ala Arg Leu Asp Leu Ser
    370   375   380

Leu Phe Leu Phe Glu Asp Glu Leu Asn Val Cys Gly Phe Leu Glu Tyr
385   390   395   400

Ala Thr Asp Arg Ile Asp Ala Ala Ser Ala Gln Asn Met Val Arg Met
            405   410   415

Leu Ser Ser Val Leu Arg Glu Phe Val Ala Ala Pro Gln Ala Pro Leu
            420   425   430

Ser Glu Val Gln Leu Gly Ala Ala Asp Ser Gln Ala Gln Thr Pro Ala
        435   440   445

Ile Ala Pro Ala Phe Pro Ser Val Pro Ala Arg Leu Phe Ala Leu Ala
    450   455   460

Asp Ser His Pro Asn Ala Thr Ala Leu Arg Asp Glu Gln Gly Glu Leu
465   470   475   480

Thr Tyr Ala Gln Val Cys Gln Gln Ile Leu Gln Ala Ala Ala Thr Leu
            485   490   495

Arg Ala Gln Gly Ala Lys Pro Gly Thr Leu Ile Ala Val Ile Gly Glu
        500   505   510

Arg Gly Asn Pro Trp Leu Ile Ala Met Leu Ala Ile Trp Gln Val Gly
        515   520   525

Gly Ile Tyr Val Pro Leu Ser Lys Asp Leu Pro Glu Gln Arg Leu Gln
    530   535   540

Gly Ile Leu Ala Glu Leu Glu Gly Ala Ile Leu Ile Thr Asp Asp Thr
545   550   555   560

Thr Pro Glu Arg Phe Arg Gln Arg Val Thr Leu Pro Met His Ala Leu
            565   570   575

Trp Ala Asp Gly Ala Thr His His Glu Arg Gln Thr Thr Asp Ala Ser
        580   585   590

Arg Leu Ser Gly Tyr Met Met Tyr Thr Ser Gly Ser Thr Gly Lys Pro
    595   600   605

```
Lys Gly Val His Val Ser Gln Ala Asn Leu Val Ala Thr Leu Ser Ala
    610             615             620

Phe Gly Gln Leu Leu Gln Val Lys Pro Ser Asp Arg Met Leu Ala Leu
625             630             635                 640

Thr Thr Phe Ser Phe Asp Ile Ser Leu Leu Glu Leu Leu Leu Pro Leu
            645             650             655

Val Gln Gly Ala Ser Val Gln Ile Ala Val Ala Gln Ala Gln Arg Asp
            660             665             670

Ala Glu Lys Leu Ala Gly Tyr Leu Ala Asp Pro Arg Ile Thr Leu Val
        675             680             685

Gln Ala Thr Pro Val Thr Trp Arg Leu Leu Leu Ser Thr Gly Trp Gln
    690             695             700

Pro Arg Glu Ser Leu Thr Leu Leu Cys Gly Gly Glu Ala Leu Pro Gln
705             710             715                 720

Asp Leu Ala Asp Arg Leu Cys Leu Pro Gly Met Thr Leu Trp Asn Leu
            725             730             735

Tyr Gly Pro Thr Glu Thr Thr Ile Trp Ser Thr Ala Cys Arg Leu Gln
            740             745             750

Pro Gly Ala Pro Val Gln Leu Gly His Pro Ile Ala Gly Thr Gln Ile
            755             760             765

Ala Leu Val Asp Arg Asn Leu Arg Ser Val Pro Arg Gly Val Ile Gly
    770             775             780

Glu Leu Leu Ile Cys Gly Pro Gly Val Ser Gln Gly Tyr Tyr Arg Asn
785             790             795                 800

Pro Val Glu Thr Ala Lys Arg Phe Val Pro Asp Pro His Gly Ser Gly
            805             810             815

Lys Arg Ala Tyr Leu Thr Gly Asp Arg Met Arg Met Gln Gln Asp Gly
            820             825             830

Ser Leu Ala Tyr Ile Gly Arg Arg Asp Asp Gln Ile Lys Leu Arg Gly
        835             840             845

His Arg Ile Glu Leu Gly Glu Ile Glu Thr Ala Leu Arg Lys Leu Pro
    850             855             860

Gly Val Arg Asp Ala Ala Ala Gln Leu His Asp Gln Asp Pro Ser Arg
865             870             875                 880

Gly Ile Gln Ala Phe Val Gln Leu Cys Ala Thr Val Asp Glu Ser Leu
            885             890             895

Ile Asp Ile Gly Gln Trp Leu Glu Thr Leu Arg Gln Thr Leu Pro Glu
            900             905             910
```

```
Ala Trp Leu Pro Thr Glu Tyr Tyr Arg Ile Asp Gly Ile Pro Leu Thr
        915             920             925

Tyr Asn Gly Lys Arg Asp Arg Lys Arg Leu Leu His Gln Ala Val Arg
    930                 935             940

Leu Gln Thr Leu Ser Leu Arg Val Ala Pro Ser Ser Asp Thr Glu Thr
945             950             955                 960

Arg Val Gln Gln Ile Trp Cys Glu Leu Leu Gly Leu Glu Asp Ile Gly
            965             970             975

Val Thr Asp Asp Phe Phe Gln Leu Gly Gly His Ser Ile Leu Val Ala
        980             985             990

Arg Met Val Glu Arg Ile Glu Thr Ala Phe Gly Arg Arg Val Pro Ile
    995             1000            1005

Ala Asp Ile Tyr Phe Ser Pro Thr Ile Ala Arg Val Ala Ala Thr Leu
    1010            1015            1020

Asp Ser Met Thr Phe Glu Gln Gly Leu Ala Ala His Ser Val Lys Gly
1025            1030            1035            1040

Asp Trp Glu Phe Thr Ala Ile Ser Leu Gln His Asn Ala Asp Ser Thr
            1045            1050            1055

Ala Ala Ala Gln Glu Arg
            1060
```

```
<210> 4
<211> 1432
<212> PRT
<213> Pseudomonas fluorescens A2-2

<400> 4
Met His Ser Pro Thr Ile Asp Thr Phe Glu Ala Ala Leu Arg Ser Leu
  1             5               10              15

Pro Ala Ala Arg Asp Ala Leu Gly Ala Tyr Pro Leu Ser Ser Glu Gln
            20              25              30

Lys Arg Leu Trp Leu Leu Ala Gln Leu Ala Gly Thr Ala Thr Leu Pro
        35              40              45

Val Thr Val Arg Tyr Ala Phe Thr Gly Thr Val Asp Leu Ala Val Val
        50              55              60

Gln Gln Asn Leu Ser Ala Trp Ile Ala His Ser Glu Ser Leu Arg Ser
 65              70              75              80

Leu Phe Val Glu Val Leu Glu Arg Pro Val Arg Leu Leu Met Pro Thr
                85              90              95

Gly Leu Val Lys Leu Glu Tyr Phe Asp Arg Pro Pro Ser Asp Ala Asp
            100             105             110
```

Met Ala Glu Leu Ile Gly Ala Ala Phe Glu Leu Asp Lys Gly Pro Leu
    115   120   125

Leu Arg Ala Phe Ile Thr Arg Thr Ala Ala Gln Gln His Glu Leu His
    130   135   140

Leu Val Gly His Pro Ile Val Val Asp Glu Pro Ser Leu Gln Arg Ile
145   150   155   160

Ala Gln Thr Leu Phe Gln Thr Glu Pro Asp His Gln Tyr Pro Ala Val
            165   170   175

Gly Ala Ile Ala Glu Val Phe Gln Arg Glu Gln Thr Leu Ala Gln Asp
        180   185   190

Ala Gln Ile Thr Glu Gln Trp Gln Gln Trp Gly Ile Gly Leu Gln Ala
        195   200   205

Pro Ala Ala Thr Glu Ile Pro Thr Glu Asn Pro Arg Pro Ala Ile Lys
    210   215   220

Gly Ser Asp Arg Gln Val His Glu Ala Leu Thr Ala Trp Gly Asp Gln
225   230   235   240

Pro Val Ala Glu Ala Glu Ile Val Ser Ser Trp Leu Thr Val Leu Met
        245   250   255

Arg Trp Gln Gly Ser Gln Ser Ala Leu Cys Ala Ile Lys Val Arg Asp
        260   265   270

Lys Ala His Ala Asn Leu Ile Gly Pro Leu Gln Thr Tyr Leu Pro Val
        275   280   285

Arg Val Asp Met Pro Asp Gly Ser Thr Leu Ala Gln Leu Arg Leu Gln
    290   295   300

Val Glu Glu Gln Leu Asn Gly Asn Asp His Pro Ser Phe Ser Thr Leu
305   310   315   320

Leu Glu Val Cys Pro Pro Lys Arg Asp Leu Ser Arg Thr Pro Tyr Phe
        325   330   335

Gln Thr Gly Leu Gln Phe Ile Ala His Asp Val Glu Gln Arg Asp Phe
        340   345   350

His Ala Gly Asn Leu Thr Arg Leu Pro Thr Lys Gln Pro Ser Ser Asp
        355   360   365

Leu Asp Leu Phe Ile Ser Cys Trp Val Ser Asp Gly Thr Leu Gly Leu
    370   375   380

Thr Leu Asp Tyr Asp Cys Ala Val Leu Asn Ser Ser Gln Val Glu Val
385   390   395   400

Leu Ala Gln Ala Leu Ile Ser Val Leu Ser Ala Pro Gly Glu Gln Pro
            405   410   415

```
Ile Ala Thr Val Ala Leu Met Gly Gln Gln Met Gln Gln Thr Val Leu
            420             425             430

Ala Gln Ala His Gly Pro Arg Thr Thr Pro Pro Gln Leu Thr Leu Thr
            435             440             445

Glu Trp Val Ala Ala Ser Thr Glu Lys Ser Pro Leu Ala Val Ala Val
    450             455             460

Ile Asp His Gly Gln Gln Leu Ser Tyr Ala Glu Leu Trp Ala Arg Ala
465             470             475             480

Ala Leu Val Ala Ala Asn Ile Ser Gln His Val Ala Lys Pro Arg Ser
            485             490             495

Ile Ile Ala Val Ala Leu Pro Arg Ser Ala Glu Phe Ile Ala Ala Leu
            500             505             510

Leu Gly Val Val Arg Ala Gly His Ala Phe Leu Pro Ile Asp Pro Arg
    515             520             525

Leu Pro Thr Asp Arg Ile Gln Phe Leu Ile Glu Asn Ser Gly Cys Glu
    530             535             540

Leu Val Ile Thr Ser Asp Gln Gln Ser Val Glu Gly Trp Pro Gln Val
545             550             555             560

Ala Arg Ile Arg Met Glu Ala Leu Asp Pro Asp Ile Arg Trp Val Ala
            565             570             575

Pro Thr Gly Leu Ser His Ser Asp Ala Ala Tyr Leu Ile Tyr Thr Ser
            580             585             590

Gly Ser Thr Gly Val Pro Lys Gly Val Val Val Glu His Arg Gln Val
    595             600             605

Val Asn Asn Ile Leu Trp Arg Gln Arg Thr Trp Pro Leu Thr Ala Gln
    610             615             620

Asp Asn Val Leu His Asn His Ser Phe Ser Phe Asp Pro Ser Val Trp
625             630             635             640

Ala Leu Phe Trp Pro Leu Leu Thr Gly Gly Thr Ile Val Leu Ala Asp
            645             650             655

Val Arg Thr Met Glu Asp Ser Thr Ala Leu Leu Asp Leu Met Ile Arg
            660             665             670

His Asp Val Ser Val Leu Gly Gly Val Pro Ser Leu Leu Gly Thr Leu
            675             680             685

Ile Asp His Pro Phe Ala Asn Asp Cys Arg Ala Val Lys Leu Val Leu
    690             695             700

Ser Gly Gly Glu Val Leu Asn Pro Glu Leu Ala His Lys Ile Gln Lys
705             710             715             720
```

Val Trp Gln Ala Asp Val Ala Asn Leu Tyr Gly Pro Thr Glu Ala Thr
            725   730   735

Ile Asp Ala Leu Tyr Phe Ser Ile Asp Lys Asn Ala Ala Gly Ala Ile
            740   745   750

Pro Ile Gly Tyr Pro Ile Asp Asn Thr Asp Ala Tyr Ile Val Asp Leu
            755   760   765

Asn Leu Asn Pro Val Pro Pro Gly Val Pro Gly Glu Ile Met Leu Ala
        770   775   780

Gly Gln Asn Leu Ala Arg Gly Tyr Leu Gly Lys Pro Ala Gln Thr Ala
785   790   795   800

Gln Arg Phe Leu Pro Asn Pro Phe Gly Asn Gly Arg Val Tyr Ala Thr
            805   810   815

Gly Asp Leu Gly Arg Arg Trp Ser Ser Gly Ala Ile Ser Tyr Leu Gly
            820   825   830

Arg Arg Asp Gln Gln Val Lys Ile Arg Gly His Arg Ile Glu Leu Asn
            835   840   845

Glu Val Ala His Leu Leu Cys Gln Ala Leu Glu Leu Lys Glu Ala Ile
    850   855   860

Val Phe Ala Gln His Ala Gly Thr Glu Gln Ala Arg Leu Val Ala Ala
865   870   875   880

Ile Glu Gln Gln Pro Gly Leu His Ser Glu Gly Ile Lys Gln Glu Leu
            885   890   895

Leu Arg His Leu Pro Ala Tyr Leu Ile Pro Ser Gln Leu Leu Leu Leu
            900   905   910

Asp Glu Leu Pro Arg Thr Ala Thr Gly Lys Val Asp Met Leu Lys Leu
            915   920   925

Asp Gln Leu Ala Ala Pro Gln Leu Asn Asp Ala Gly Gly Thr Glu Cys
    930   935   940

Arg Ala Pro Arg Thr Asp Leu Glu Gln Ser Val Met Thr Asp Phe Ala
945   950   955   960

Gln Val Leu Gly Leu Thr Ala Val Thr Pro Asp Thr Asp Phe Phe Glu
            965   970   975

Gln Gly Gly Asn Ser Ile Leu Leu Thr Arg Leu Ala Gly Thr Leu Ser
            980   985   990

Ala Lys Tyr Gln Val Gln Ile Pro Leu His Glu Phe Phe Leu Thr Pro
        995   1000   1005

Thr Pro Ala Ala Val Ala Gln Ala Ile Glu Ile Tyr Arg Arg Glu Gly
    1010   1015   1020

Leu Thr Ala Leu Leu Ser Arg Gln His Ala Gln Thr Leu Glu Gln Asp
1025   1030   1035   1040

Ile Tyr Leu Glu Glu His Ile Arg Pro Asp Gly Leu Pro His Ala Asn
            1045   1050   1055

Trp Tyr Gln Pro Ser Val Val Phe Leu Thr Gly Ala Thr Gly Tyr Leu
            1060   1065   1070

Gly Leu Tyr Leu Ile Glu Gln Leu Leu Lys Arg Thr Thr Ser Arg Val
            1075   1080   1085

Ile Cys Leu Cys Arg Ala Lys Asp Ala Glu His Ala Lys Ala Arg Ile
            1090   1095   1100

Leu Glu Gly Leu Lys Thr Tyr Arg Ile Asp Val Gly Ser Glu Leu His
1105   1110   1115   1120

Arg Val Glu Tyr Leu Thr Gly Asp Leu Ala Leu Pro His Leu Gly Leu
            1125   1130   1135

Ser Glu His Gln Trp Gln Thr Leu Ala Glu Glu Val Asp Val Ile Tyr
            1140   1145   1150

His Asn Gly Ala Leu Val Asn Phe Val Tyr Pro Tyr Ser Ala Leu Lys
            1155   1160   1165

Ala Thr Asn Val Gly Gly Thr Gln Ala Ile Leu Glu Leu Ala Cys Thr
            1170   1175   1180

Ala Arg Leu Lys Ser Val Gln Tyr Val Ser Thr Val Asp Thr Leu Leu
1185   1190   1195   1200

Ala Thr His Val Pro Arg Pro Phe Ile Glu Asp Asp Ala Pro Leu Arg
            1205   1210   1215

Ser Ala Val Gly Val Pro Val Gly Tyr Thr Gly Ser Lys Trp Val Ala
            1220   1225   1230

Glu Gly Val Ala Asn Leu Gly Leu Arg Arg Gly Ile Pro Val Ser Ile
            1235   1240   1245

Phe Arg Pro Gly Leu Ile Leu Gly His Thr Glu Thr Gly Ala Ser Gln
1250   1255   1260

Ser Ile Asp Tyr Leu Leu Val Ala Leu Arg Gly Phe Leu Pro Met Gly
1265   1270   1275   1280

Ile Val Pro Asp Tyr Pro Arg Ile Phe Asp Ile Val Pro Val Asp Tyr
            1285   1290   1295

Val Ala Ala Ala Ile Val His Ile Ser Met Gln Pro Gln Gly Arg Asp
            1300   1305   1310

Lys Phe Phe His Leu Phe Asn Pro Ala Pro Val Thr Ile Arg Gln Phe
            1315   1320   1325

```
Cys Asp Trp Ile Arg Glu Phe Gly Tyr Glu Phe Lys Leu Val Asp Phe
    1330                1335                1340

Glu His Gly Arg Gln Gln Ala Leu Ser Val Pro Pro Gly His Leu Leu
1345                1350                1355                1360

Tyr Pro Leu Val Pro Leu Ile Arg Asp Ala Asp Pro Leu Pro His Arg
                1365                1370                1375

Ala Leu Asp Pro Asp Tyr Ile His Glu Val Asn Pro Ala Leu Glu Cys
            1380                1385                1390

Lys Gln Thr Leu Glu Leu Leu Ala Ser Ser Asp Ile Thr Leu Ser Lys
        1395                1400                1405

Thr Thr Lys Ala Tyr Ala His Thr Ile Leu Arg Tyr Leu Ile Asp Thr
    1410                1415                1420

Gly Phe Met Ala Lys Pro Gly Val
1425                1430


<210> 5
<211> 350
<212> PRT
<213> Pseudomonas fluorescens A2-2

<400> 5
Met Glu Ser Ile Ala Phe Pro Ile Ala His Lys Pro Phe Ile Leu Gly
    1               5                   10                  15

Cys Pro Glu Asn Leu Pro Ala Thr Glu Arg Ala Leu Ala Pro Ser Ala
            20                  25                  30

Ala Met Ala Arg Gln Val Leu Glu Tyr Leu Glu Ala Cys Pro Gln Ala
        35                  40                  45

Lys Asn Leu Glu Gln Tyr Leu Gly Thr Leu Arg Glu Val Leu Ala His
    50                  55                  60

Leu Pro Cys Ala Ser Thr Gly Leu Met Thr Asp Asp Pro Arg Glu Asn
65                  70                  75                  80

Gln Glu Asn Arg Asp Asn Asp Phe Ala Phe Gly Ile Glu Arg His Gln
            85                  90                  95

Gly Asp Thr Val Thr Leu Met Val Lys Ala Thr Leu Asp Ala Ala Ile
            100                 105                 110

Gln Thr Gly Glu Leu Val Gln Arg Ser Gly Thr Ser Leu Asp His Ser
        115                 120                 125

Glu Trp Ser Asp Met Met Ser Val Ala Gln Val Ile Leu Gln Thr Ile
    130                 135                 140

Ala Asp Pro Arg Val Met Pro Glu Ser Arg Leu Thr Phe Gln Ala Pro
145                 150                 155                 160
```

```
Lys Ser Lys Val Glu Glu Asp Asp Gln Asp Pro Leu Arg Arg Trp Val
            165             170             175

Arg Gly His Leu Leu Phe Met Val Leu Cys Gln Gly Met Ser Leu Cys
            180             185             190

Thr Asn Leu Leu Ile Ser Ala Ala His Asp Lys Asp Leu Glu Leu Ala
            195             200             205

Cys Ala Gln Ala Asn Arg Leu Ile Gln Leu Met Asn Ile Ser Arg Ile
    210             215             220

Thr Leu Glu Phe Ala Thr Asp Leu Asn Ser Gln Gln Tyr Val Ser Gln
225             230             235             240

Ile Arg Pro Thr Leu Met Pro Ala Ile Ala Pro Pro Lys Met Ser Gly
            245             250             255

Ile Asn Trp Arg Asp His Val Val Met Ile Arg Trp Met Arg Gln Ser
            260             265             270

Thr Asp Ala Trp Asn Phe Ile Glu Gln Ala Tyr Pro Gln Leu Ala Glu
            275             280             285

Arg Met Arg Thr Thr Leu Ala Gln Val Tyr Ser Ala His Arg Gly Val
    290             295             300

Cys Glu Lys Phe Val Gly Glu Glu Asn Thr Ser Leu Leu Ala Lys Glu
305             310             315             320

Asn Ala Thr Asn Thr Ala Gly Gln Val Leu Glu Asn Leu Lys Lys Ser
            325             330             335

Arg Leu Lys Tyr Leu Lys Thr Lys Gly Cys Ala Gly Ala Gly
            340             345             350
```

<210> 6
<211> 61
<212> PRT
<213> Pseudomonas fluorescens A2-2

<400> 6
```
Met Pro Thr Phe Leu Gly Asp Asp Asp Ala Val Pro Cys Val Val Val
  1             5              10             15

Val Asn Ala Asp Lys His Tyr Ser Ile Trp Pro Ser Ala Arg Asp Ile
            20             25             30

Pro Ser Gly Trp Ser Glu Glu Gly Phe Lys Gly Ser Arg Ser Asp Cys
            35             40             45

Leu Glu His Ile Ala Gln Ile Trp Pro Glu Pro Thr Ala
    50             55             60
```

<210> 7
<211> 355
<212> PRT
<213> Pseudomonas fluorescens A2-2

<400> 7

```
Met Thr Ser Thr His Arg Thr Thr Asp Gln Val Lys Pro Ala Val Leu
  1               5                  10                  15

Asp Met Pro Gly Leu Ser Gly Ile Leu Phe Gly His Ala Ala Phe Gln
             20                  25                  30

Tyr Leu Arg Ala Ser Cys Glu Leu Asp Leu Phe Glu His Val Arg Asp
         35                  40                  45

Leu Arg Glu Ala Thr Lys Glu Ser Ile Ser Ser Arg Leu Lys Leu Gln
     50                  55                  60

Glu Arg Ala Ala Asp Ile Leu Leu Leu Gly Ala Thr Ser Leu Gly Met
 65                  70                  75                  80

Leu Val Lys Glu Asn Gly Ile Tyr Arg Asn Ala Asp Val Val Glu Asp
                 85                  90                  95

Leu Met Ala Thr Asp Asp Trp Gln Arg Phe Lys Asp Thr Val Ala Phe
            100                 105                 110

Glu Asn Tyr Ile Val Tyr Glu Gly Gln Leu Asp Phe Thr Glu Ser Leu
            115                 120                 125

Gln Lys Asn Thr Asn Val Gly Leu Gln Arg Phe Pro Gly Glu Gly Arg
    130                 135                 140

Asp Leu Tyr His Arg Leu His Gln Asn Pro Lys Leu Glu Asn Val Phe
145                 150                 155                 160

Tyr Arg Tyr Met Arg Ser Trp Ser Glu Leu Ala Asn Gln Asp Leu Val
                165                 170                 175

Lys His Leu Asp Leu Ser Arg Val Lys Lys Leu Leu Asp Ala Gly Gly
            180                 185                 190

Gly Asp Ala Val Asn Ala Ile Ala Leu Ala Lys His Asn Glu Gln Leu
            195                 200                 205

Asn Val Thr Val Leu Asp Ile Asp Asn Ser Ile Pro Val Thr Gln Gly
    210                 215                 220

Lys Ile Asn Asp Ser Gly Leu Ser His Arg Val Lys Ala Gln Ala Leu
225                 230                 235                 240

Asp Ile Leu His Gln Ser Phe Pro Glu Gly Tyr Asp Cys Ile Leu Phe
                245                 250                 255

Ala His Gln Leu Val Ile Trp Thr Leu Glu Glu Asn Thr His Met Leu
                260                 265                 270
```

```
Arg Lys Ala Tyr Asp Ala Leu Pro Glu Gly Gly Arg Val Val Ile Phe
    275                 280                 285

Asn Ser Met Ser Asn Asp Glu Gly Asp Gly Pro Val Met Ala Ala Leu
    290                 295                 300

Asp Ser Val Tyr Phe Ala Cys Leu Pro Ala Glu Gly Gly Met Ile Tyr
305                 310                 315                 320

Ser Trp Lys Gln Tyr Glu Val Cys Leu Ala Glu Ala Gly Phe Lys Asn
            325                 330                 335

Pro Val Arg Thr Ala Ile Pro Gly Trp Thr Pro His Gly Ile Ile Val
            340                 345                 350

Ala Tyr Lys
        355


<210> 8
<211> 347
<212> PRT
<213> Pseudomonas fluorescens A2-2

<400> 8
Met Ala Arg Ser Pro Glu Thr Asn Ser Ala Met Pro Gln Gln Ile Arg
  1               5                  10                  15

Gln Leu Leu Tyr Ser Gln Leu Ile Ser Gln Ser Ile Gln Thr Phe Cys
            20                  25                  30

Glu Leu Arg Leu Pro Asp Val Leu Gln Ala Ala Gly Gln Pro Thr Ser
        35                  40                  45

Ile Glu Arg Leu Ala Glu Gln Thr His Thr His Ile Ser Ala Leu Ser
    50                  55                  60

Arg Leu Leu Lys Ala Leu Lys Pro Phe Gly Leu Val Lys Glu Thr Asp
65                  70                  75                  80

Glu Gly Phe Ser Leu Thr Asp Leu Gly Ala Ser Leu Thr His Asp Ala
            85                  90                  95

Phe Ala Ser Ala Gln Pro Ser Ala Leu Leu Ile Asn Gly Glu Met Gly
            100                 105                 110

Gln Ala Trp Arg Gly Met Ala Gln Thr Ile Arg Thr Gly Glu Ser Ser
            115                 120                 125

Phe Lys Met Tyr Tyr Gly Ile Ser Leu Phe Glu Tyr Phe Glu Gln His
    130                 135                 140

Pro Glu Arg Arg Ala Ile Phe Asp Arg Ser Gln Asp Met Gly Leu Asp
145                 150                 155                 160

Leu Glu Ile Pro Glu Ile Leu Glu Asn Ile Asn Leu Asn Asp Gly Glu
            165                 170                 175
```

```
Asn Ile Val Asp Val Gly Gly Gly Ser Gly His Leu Leu Met His Met
            180             185             190
```

```
Leu Asp Lys Trp Pro Glu Ser Thr Gly Ile Leu Phe Asp Leu Pro Val
            195             200             205
```

```
Ala Ala Lys Ile Ala Gln Gln His Leu His Lys Ser Gly Lys Ala Gly
            210             215             220
```

```
Cys Phe Glu Ile Val Ala Gly Asp Phe Phe Lys Ser Leu Pro Asp Ser
225             230             235             240
```

```
Gly Ser Val Tyr Leu Leu Ser His Val Leu His Asp Trp Gly Asp Glu
            245             250             255
```

```
Asp Cys Lys Ala Ile Leu Ala Thr Cys Arg Arg Ser Met Pro Asp Asn
            260             265             270
```

```
Ala Leu Leu Val Val Val Asp Leu Val Ile Asp Gln Ser Glu Ser Ala
            275             280             285
```

```
Gln Pro Asn Pro Thr Gly Ala Met Met Asp Leu Tyr Met Leu Ser Leu
            290             295             300
```

```
Phe Gly Ile Ala Gly Gly Lys Glu Arg Asn Glu Asp Glu Phe Arg Thr
305             310             315             320
```

```
Leu Ile Glu Asn Ser Gly Phe Asn Val Lys Gln Val Lys Arg Leu Pro
            325             330             335
```

```
Ser Gly Asn Gly Ile Ile Phe Ala Tyr Pro Lys
            340             345
```

```
<210> 9
<211> 180
<212> PRT
<213> Pseudomonas fluorescens A2-2
```

```
<400> 9
Met Ser Thr Leu Val Tyr Tyr Val Ala Ala Thr Leu Asp Gly Tyr Ile
 1           5               10              15
```

```
Ala Thr Gln Gln His Lys Leu Asp Trp Leu Glu Asn Phe Ala Leu Gly
            20              25              30
```

```
Asp Asp Ala Thr Ala Tyr Asp Asp Phe Tyr Gln Thr Ile Gly Ala Val
            35              40              45
```

```
Val Met Gly Ser Gln Thr Tyr Glu Trp Ile Met Ser Asn Ala Pro Asp
    50              55              60
```

```
Asp Trp Pro Tyr Gln Asp Val Pro Ala Phe Val Met Ser Asn Arg Asp
65              70              75              80
```

```
Leu Ser Ala Pro Ala Asn Leu Asp Ile Thr Phe Leu Arg Gly Asp Ala
            85              90              95
```

```
Ser Ala Ile Ala Val Arg Ala Arg Gln Ala Ala Lys Gly Lys Asn Val
            100                 105             110

Trp Leu Val Gly Gly Gly Lys Thr Ala Ala Cys Phe Ala Asn Ala Gly
            115             120             125

Glu Leu Gln Gln Leu Phe Ile Thr Thr Ile Pro Thr Phe Ile Gly Thr
    130                 135             140

Gly Val Pro Val Leu Pro Val Asp Arg Ala Leu Glu Val Val Leu Arg
145             150             155                 160

Glu Gln Arg Thr Leu Gln Ser Gly Ala Met Glu Cys Ile Leu Asp Val
            165             170             175

Lys Lys Ala Asp
            180


<210> 10
<211> 220
<212> PRT
<213> Pseudomonas fluorescens A2-2

<400> 10
Met Ser Asn Val Phe Ser Gly Gly Lys Gly Asn Gly Asn Pro Gly Phe
  1           5               10                  15

Val Arg Thr Phe Ser Arg Ile Ala Pro Thr Tyr Glu Glu Lys Tyr Gly
            20              25              30

Thr Lys Leu Ser Gln Ala His Asp Asp Cys Leu Arg Met Leu Ser Arg
        35              40              45

Trp Met Cys Thr Ser Arg Pro Glu Arg Val Leu Asp Ile Gly Cys Gly
    50                  55                  60

Thr Gly Ala Leu Ile Glu Arg Met Phe Ala Leu Trp Pro Glu Ala Arg
65              70              75                  80

Phe Glu Gly Val Asp Pro Ala Gln Gly Met Val Asp Glu Ala Ala Lys
            85              90                  95

Arg Arg Pro Phe Ala Ser Phe Val Lys Gly Val Ala Glu Ala Leu Pro
            100             105             110

Phe Pro Ser Gln Ser Met Asp Leu Val Val Cys Ser Met Ser Phe Gly
        115             120             125

His Trp Ala Asp Lys Ser Val Ser Leu Asn Glu Val Arg Arg Val Leu
    130             135             140

Lys Pro Gln Gly Leu Phe Cys Leu Val Glu Asn Leu Pro Ala Gly Trp
145             150             155             160

Gly Leu Thr Thr Leu Ile Asn Trp Leu Leu Gly Ser Leu Ala Asp Tyr
            165             170             175
```

Arg Ser Glu His Glu Val Ile Gln Leu Ala Gln Thr Ala Gly Leu Gln
          180   185   190

Ser Met Glu Thr Ser Val Thr Asp Gln His Val Ile Val Ala Thr Phe
          195   200   205

Arg Pro Cys Cys Gly Glu Val Gly Asp His Gly Arg
         210   215   220

<210> 11
<211> 509
<212> PRT
<213> Pseudomonas fluorescens A2-2

<400> 11
Met Val Val Lys Asn Lys Gln Val Leu Val Val Gly Ala Gly Pro Val
   1   5   10   15

Gly Leu Ala Val Ala Ala Ala Leu Ala Glu Leu Gly Ile Ala Val Asp
          20   25   30

Leu Ile Asp Lys Arg Pro Ala Ala Ser Pro His Ser Arg Ala Phe Gly
         35   40   45

Leu Glu Pro Val Thr Leu Glu Leu Leu Asn Ala Trp Gly Val Ala Asp
     50   55   60

Glu Met Ile Arg Arg Gly Ile Val Trp Ala Ser Ala Pro Leu Gly Asp
 65   70   75   80

Lys Ala Gly Arg Thr Leu Ser Phe Ser Lys Leu Pro Cys Glu Tyr Pro
             85   90   95

His Met Val Ile Ile Pro Gln Ser Gln Thr Glu Ser Val Leu Thr Asp
         100   105   110

Trp Val Asn Arg Lys Gly Val Asn Leu Lys Arg Gly Tyr Ala Leu Lys
         115   120   125

Ala Leu Asp Ala Gly Asp Leu His Val Glu Val Thr Leu Glu His Ser
     130   135   140

Glu Thr Gly Ser Val Gln Gln Ser Arg Tyr Asp Trp Val Leu Gly Ala
145   150   155   160

Asp Gly Val Asn Ser Ser Val Arg Gln Leu Leu Asn Ile Ser Phe Val
         165   170   175

Gly Gln Asp Tyr Lys His Ser Leu Val Val Ala Asp Val Val Leu Arg
         180   185   190

Asn Pro Pro Ser Pro Ala Val His Ala Arg Ser Val Ser Arg Gly Leu
         195   200   205

Val Ala Leu Phe Pro Leu Pro Asp Gly Ser Tyr Arg Val Ser Ile Glu
     210   215   220

```
Asp Asn Glu Arg Met Asp Thr Pro Val Lys Gln Pro Val Thr His Glu
225             230             235             240

Glu Ile Ala Gly Gly Met Lys Asp Ile Leu Gly Thr Asp Phe Gly Leu
            245             250             255

Ala Gln Val Leu Trp Ser Ala Arg Tyr Arg Ser Gln Gln Arg Leu Ala
            260             265             270

Thr His Tyr Arg Gln Gly Arg Val Phe Leu Leu Gly Asp Ala Ala His
        275             280             285

Thr His Val Pro Ala Gly Gly Gln Gly Leu Gln Met Gly Ile Gly Asp
        290             295             300

Ala Ala Asn Leu Ala Trp Lys Leu Ala Gly Val Ile Gln Ala Thr Leu
305             310             315             320

Pro Met Asp Leu Leu Glu Ser Tyr Glu Ala Glu Arg Arg Pro Ile Ala
            325             330             335

Ala Ala Ala Leu Arg Asn Thr Asp Leu Leu Phe Arg Phe Asn Thr Ala
            340             345             350

Ser Gly Pro Ile Gly Arg Leu Ile His Trp Ile Gly Leu Gln Ala Thr
        355             360             365

Arg Ala Pro Tyr Val Ala Gln Lys Val Val Ser Ala Leu Ala Gly Glu
    370             375             380

Gly Val Arg Tyr Asp Ser Val Arg Arg Arg Gly Asp His Arg Leu Val
385             390             395             400

Gly Arg Arg Leu Pro Leu Leu Ser Leu Leu Pro Glu Gly Glu Arg Leu
            405             410             415

Pro Arg Gln Ser Leu Thr Gln Leu Leu Arg Ala Gly Arg Phe Val Leu
            420             425             430

Val His His Arg Ala Lys Ala Leu Ala Ala Asp Leu Arg Arg Asp Phe
        435             440             445

Pro Gly Leu Gln Thr Ala Ser Ile Cys Glu Asp Ser His Asn Asn Ser
    450             455             460

Leu Ser Ala Gly Glu Gly Val Ile Val Arg Pro Asp Gly Val Val Ile
465             470             475             480

Trp Val Gly Lys Lys Ser Thr Leu Ala Lys Glu Arg Leu Gly Glu Trp
            485             490             495

Leu Leu Asp Asp Ser Lys Ser Ala Arg Gln Ser Leu Thr
            500             505
```

<210> 12
<211> 348
<212> PRT
<213> Pseudomonas fluorescens A2-2

<400> 12

```
Met Ala His Tyr Asp Ser Val Gly Thr Ala Pro Gly Ala Ser Asp Asp
 1               5                  10                  15

Gly Met Ala Val Ala Ser Ile Leu Gln Leu Met Arg Glu Thr Ile Thr
                20                  25                  30

Arg Ser Asp Ala Lys Asn Asn Val Val Phe Leu Leu Ala Asp Gly Glu
            35                  40                  45

Glu Leu Gly Leu Leu Gly Ala Glu His Tyr Val Ser Gln Leu Ser Thr
        50                  55                  60

Pro Glu Arg Glu Ala Ile Arg Leu Val Leu Asn Phe Glu Ala Arg Gly
65                  70                  75                  80

Asn Gln Gly Ile Pro Leu Leu Phe Glu Thr Ser Gln Lys Asp Tyr Ala
                85                  90                  95·

Leu Ile Arg Thr Val Asn Ala Gly Val Arg Asp Ile Ile Ser Phe Ser
            100                 105                 110

Phe Thr Pro Leu Ile Tyr Asn Met Leu Gln Asn Asp Thr Asp Phe Thr
        115                 120                 125

Val Phe Arg Lys Lys Asn Ile Ala Gly Leu Asn Phe Ala Val Val Glu
    130                 135                 140

Gly Phe Gln His Tyr His His Met Ser Asp Thr Val Glu Asn Leu Gly
145                 150                 155                 160

Pro Glu Thr Leu Phe Arg Tyr Gln Lys Thr Val Arg Glu Val Gly Asn
                165                 170                 175

His Phe Ile Gln Gly Ile Asp Leu Ser Ser Leu Ser Ala Asp Glu Asp
            180                 185                 190

Ala Thr Tyr Phe Pro Leu Pro Gly Gly Thr Leu Leu Val Leu Asn Leu
        195                 200                 205

Pro Thr Leu Tyr Ala Leu Gly Met Gly Ser Phe Val Leu Cys Gly Leu
    210                 215                 220

Trp Ala Gln Arg Cys Arg Thr Arg Arg Gln His Gln Gly Lys Asn Cys
225                 230                 235                 240

Val Leu Arg Pro Met Ala Ile Ala Leu Leu Gly Ile Ala Cys Ala Ala
                245                 250                 255

Leu Val Phe Tyr Val Pro Ser Ile Ala Tyr Leu Phe Val Ile Pro Ser
                260                 265                 270
```

Leu Leu Leu Ala Cys Ala Met Leu Ser Arg Ser Leu Phe Ile Ser Tyr
        275   280   285

Ser Ile Met Leu Leu Gly Ala Tyr Ala Cys Gly Ile Leu·Tyr Ala Pro
    290   295   300

Ile Val Tyr Leu Ile Ser Ser Gly Leu Lys Met Pro Phe Ile Ala Gly
305   310   315   320

Val Ile Ala Leu Leu Pro Leu Cys Leu Leu Ala Val Gly Leu Ala Gly
            325   330   335

Val Ile Ala Arg Ser Arg Asp Cys Arg Thr Cys Asp
        340   345

<210> 13
<211> 572
<212> PRT
<213> Pseudomonas fluorescens A2-2

<400> 13
Met Arg Ser Leu Lys Ile Ile Val Leu Ala Ser Ala Phe Asn Gly Leu
  1   5   10   15

Thr Gln Arg Ala Trp Leu Asp Leu Arg Gln Ser Gly His Ala Pro Ser
        20   25   30

Val Val Leu Phe Thr Asp Pro Ala Leu Val Cys Gln Gln Ile Glu Asp
        35   40   45

Ser Asp Ala Asp Leu Val Ile Cys Pro Phe Leu Lys Asp Arg Val Pro
    50   55   60

Gln Gln Leu Trp Ser Asn Leu Glu Arg Pro Val Val Ile Ile His Pro
 65   70   75   80

Gly Ile Val Gly Asp Arg Gly Ala Ser Ala Leu Asp Trp Ala Ile Ser
            85   90   95

Gln Gln Val Gly Arg Trp Gly Val Thr Ala Leu Gln Ala Val Glu Glu
            100   105   110

Met Asp Ala Gly Pro Ile Trp Ser Thr Cys Glu Phe Asp Met Pro Ala
        115   120   125

Asp Val Arg Lys Ser Glu Leu Tyr Asn Gly Ala Val Ser Asp Ala Ala
    130   135   140

Leu Tyr Cys Ile Arg Asp Val Val Glu Lys Phe Ala Arg Val Phe Val
145   150   155   160

Pro Val Pro Leu Asp Tyr Thr Gln Ala His Val Ile Gly Arg Leu Gln
            165   170   175

Pro Asn Met Thr Gln Ala Asp Arg Thr Phe Ser Trp Tyr Asp Cys Ala
            180   185   190

```
Arg Phe Ile Lys Arg Cys Ile Asp Ala Ala Asp Gly Gln Pro Gly Val
        195         200         205

Leu Ala Ser Ile Gln Gly Gly Gln Tyr Tyr Leu Tyr Asp Ala His Leu
    210         215         220

Asp Ala Arg His Gly Thr Pro Gly Glu Ile Leu Ala Val Gln Asp Asp
225             230         235                 240

Ala Val Leu Val Ala Ala Gly Asp Gln Ser Leu Trp Ile Gly Ser Leu
            245         250                 255

Lys Arg Lys Ala Arg Pro Gly Glu Glu Thr Phe Lys Leu Pro Ala Arg
            260         265         270

His Val Leu Ala Glu Ala Leu Ala Asp Ile Pro Val Leu Asp Ser Ser
        275         280         285

Ile Ala Asn Gln Met Phe Asp Glu Gln Ala Tyr Gln Pro Ile Arg Tyr
        290         295         300

Arg Glu Ala Gly His Val Gly Glu Leu Thr Phe Glu Phe Tyr Asn Gly
305             310         315                 320

Ala Met Ser Thr Glu Gln Cys Gln Arg Leu Val Ala Ala Leu Arg Trp
            325         330         335

Ala Lys Thr Arg Asp Thr Gln Val Leu Val Ile Lys Gly Gly Arg Gly
            340         345         350

Ser Phe Ser Asn Gly Val His Leu Asn Val Ile Gln Ala Ala Pro Val
        355         360         365

Pro Gly Leu Glu Ala Trp Ala Asn Ile Gln Ala Ile Tyr Asp Val Cys
    370         375         380

His Glu Leu Leu Thr Ala Arg Gln Leu Val Ile Ser Gly Leu Thr Gly
385             390         395                 400

Ser Ala Gly Ala Gly Gly Val Met Leu Ala Leu Ala Ala Asp Ile Val
            405         410         415

Leu Ala Arg Glu Ser Val Val Leu Asn Pro His Tyr Lys Thr Met Gly
            420         425         430

Leu Tyr Gly Ser Glu Tyr Trp Thr Tyr Ser Leu Pro Arg Ala Val Gly
        435         440         445

Ser Glu Val Ala His Gln Leu Thr Asp Ala Cys Leu Pro Ile Ser Ala
    450         455         460

Leu Gln Ala Glu Gln Tyr Gly Leu Val Gln Gly Ile Gly Pro Arg Cys
465         470         475                 480

Pro His Ala Phe Ser Arg Trp Leu Met Gln Gln Ala Ser Ser Ala Leu
            485         490         495
```

```
Thr Asp Glu Lys Tyr Ala Val Ala Arg Ala Arg Lys Ala Ala Leu Asp
        500             505             510
```

```
Ile Asp Gln Ile Thr Arg Cys Arg Glu Ala Glu Leu Ala Gln Met Gln
        515             520             525
```

```
Leu Asp Met Val His Asn Arg His Gln Phe Ala Glu Lys Cys Arg Asn
        530             535             540
```

```
Phe Val Leu Lys Arg Lys Thr Cys Gln Thr Pro Gln Arg Leu Met Ala
545             550             555             560
```

```
Pro Trp Ala Val Ala Arg Glu Ala Ala Leu Val Gly
            565             570
```

```
<210> 14
<211> 230
<212> PRT
<213> Pseudomonas fluorescens A2-2
```

```
<400> 14
Met Ile Gly Ile Val Ile Pro Ala His Asn Glu Glu Arg His Ile Ser
 1           5               10              15
```

```
Ala Cys Leu Ala Ser Ile Gln Arg Ala Ile Ala His Pro Ala Leu Ala
            20              25              30
```

```
His Gln Gln Val Gln Leu Leu Val Val Leu Asp Ala Cys Ser Asp Glu
            35              40              45
```

```
Thr Ala Thr Arg Val Ser Ala Met Gly Val Ala Thr Leu Glu Val Ser
        50              55              60
```

```
Val Arg Asn Val Gly Lys Ala Arg Ala Leu Gly Ala Glu Arg Leu Leu
65              70              75              80
```

```
Glu Val Gly Ala Gln Trp Leu Ala Phe Thr Asp Ala Asp Thr Val Val
            85              90              95
```

```
Pro Ala Asp Trp Leu Val Arg Gln Ile Gly Phe Gly Ala Asp Ala Val
            100             105             110
```

```
Cys Gly Thr Val Glu Val Asp Ser Trp Ser Glu Tyr Gly Glu Ser Val
        115             120             125
```

```
Arg Ser Arg Tyr Leu Glu Leu Tyr Gln Phe Thr Glu Asn His Arg His
        130             135             140
```

```
Ile His Gly Ala Asn Leu Gly Leu Ser Ala Asp Ala Tyr Arg Asn Ala
145             150             155             160
```

```
Gly Gly Phe Gln His Leu Val Ala His Glu Asp Val Gln Leu Val Ala
            165             170             175
```

```
Asp Leu Glu Arg Ile Gly Ala Arg Ile Val Trp Thr Ala Thr Asn Pro
            180             185             190
```

Val Val Thr Ser Ala Arg Arg Asp Tyr Lys Cys Arg Gly Gly Phe Gly
    195   200   205

Glu Tyr Leu Ala Ser Leu Val Ala Glu Gly Thr Arg Glu His Ser Pro
    210   215   220

Ala His Ala Pro Ile Gly
225   230

<210> 15
<211> 348
<212> PRT
<213> Pseudomonas fluorescens A2-2

<400> 15
Met His Pro His Lys Thr Ala Ile Val Leu Ile Glu Tyr Gln Asn Asp
  1   5   10   15

Phe Thr Thr Pro Gly Gly Val Phe His Asp Ala Val Lys Asp Val Met
      20   25   30

Gln Thr Ser Asn Met Leu Ala Asn Thr Ala Thr Thr Ile Glu Gln Ala
      35   40   45

Arg Lys Leu Gly Val Lys Ile Ile His Leu Pro Ile Arg Phe Ala Asp
    50   55   60

Gly Tyr Pro Glu Leu Thr Leu Arg Ser Tyr Gly Ile Leu Lys Gly Val
65   70   75   80

Ala Asp Gly Ser Ala Phe Arg Ala Gly Ser Trp Gly Ala Glu Ile Thr
         85   90   95

Asp Ala Leu Lys Arg Asp Pro Thr Asp Ile Val Ile Glu Gly Lys Arg
         100   105   110

Gly Leu Asp Ala Phe Ala Thr Thr Gly Leu Asp Leu Val Leu Arg Asn
      115   120   125

Asn Gly Ile Gln Asn Leu Val Val Ala Gly Phe Leu Thr Asn Cys Cys
      130   135   140

Val Glu Gly Thr Val Arg Ser Gly Tyr Glu Lys Gly Tyr Asp Val Val
145   150   155   160

Thr Leu Thr Asp Cys Thr Ala Thr Phe Ser Asp Glu Gln Gln Arg Ala
         165   170   175

Ala Glu Gln Phe Thr Leu Pro Met Phe Phe Ala Asn Pro Ala Thr His
         180   185   190

Arg Val Ser Ala Ser Thr Glu Arg Arg Ile Lys Lys Ala Ala Thr Pro
      195   200   205

Ala Glu Ser Pro Leu Phe Cys Leu Gly His Ser Val Gly Ala Tyr Cys
      210   215   220

```
Ile Ser Pro Phe Pro Asn Asp Gln Ser Ser Arg Phe Thr Ser Thr Arg
225             230             235             240

Leu Ile His Thr Ser Ser Leu Arg Ser Pro Val Leu Ala Trp Met Pro
            245             250             255

Ser Ala Met Asn Leu Lys Ala Phe Phe Thr Ser Met Leu Arg Pro Ala
            260             265             270

Phe His Val Thr Trp Ile Asn Thr Ile Leu Gly Val Val Thr Pro Arg
            275             280             285

Tyr Pro Ala Ala Gly Thr Ser Ser Ser Leu Ala Trp Arg Leu Met Ile
    290             295             300

Trp Asn Leu Ser Cys Ser Gly Thr Leu Ala Thr Leu Val Ile Ala Ala
305             310             315             320

Tyr Thr Thr Ser Pro Met Ala Val Ala Val Ser Val Glu Val Ser Ala
            325             330             335

Ala Arg Ser Ile Arg Thr Lys Gly Met Asp Lys Ser
            340             345
```

```
<210> 16
<211> 5
<212> PRT
<213> Unknown Organism

<220>
<223> Description of Unknown Organism: Illustrative core
      peptide

<400> 16
Leu Lys Ala Gly Ala
  1               5


<210> 17
<211> 10
<212> PRT
<213> Unknown Organism

<220>
<223> Description of Unknown Organism: Illustrative core
      peptide

<220>
<221> MOD_RES
<222> (4)
<223> Ser or Thr

<220>
<221> MOD_RES
<222> (7)
<223> Variable amino acid
```

<400> 17
Ser Gly Thr Xaa Thr Gly Xaa Pro Lys Gly
 1   5   10

<210> 18
<211> 9
<212> PRT
<213> Unknown Organism

<220>
<223> Description of Unknown Organism: Illustrative core
      peptide

<220>
<221> MOD_RES
<222> (5)
<223> Variable amino acid

<400> 18
Lys Ile Arg Gly Xaa Arg Ile Glu Leu
 1   5

<210> 19
<211> 5
<212> PRT
<213> Unknown Organism

<220>
<223> Description of Unknown Organism: Illustrative core
      peptide

<220>
<221> MOD_RES
<222> (4)
<223> Variable amino acid

<400> 19
Leu Gly Gly Xaa Ser
 1   5

<210> 20
<211> 14
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
      primer

<220>
<221> modified_base
<222> (6)
<223> a, c, t, g, unknown or other

```
<220>
<221> modified_base
<222> (9)
<223> a, c, t, g, unknown or other

<220>
<221> modified_base
<222> (12)
<223> a, c, t, g, unknown or other

<400> 20
tayggnccna cnga                                                    14


<210> 21
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
      primer

<220>
<221> modified_base
<222> (3)
<223> a, c, t, g, unknown or other

<220>
<221> modified_base
<222> (6)
<223> a, c, t, g, unknown or other

<220>
<221> modified_base
<222> (9)
<223> a, c, t, g, unknown or other

<220>
<221> modified_base
<222> (12)
<223> a, c, t, g, unknown or other

<400> 21
tsnccnccna dntcraaraa                                              20


<210> 22
<211> 22
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
      oligonucleotide

<400> 22
cgtctagaca ccggcttcat gg                                           22
```

```
<210> 23
<211> 26
<212> DNA

<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
      oligonucleotide

<400> 23
ggtctagata acagccaaca aacata                                    26


<210> 24
<211> 23
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
      oligonucleotide

<400> 24
catctagacc ggactgatat tcg                                       23


<210> 25
<211> 26
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
      oligonucleotide

<400> 25
ggtctagata acagccaaca aacata                                    26


<210> 26
<211> 6
<212> PRT
<213> Unknown Organism

<220>
<223> Description of Unknown Organism: Illustrative core
      peptide

<400> 26
Leu Lys Ala Gly Gly Ala
  1               5
```

<210> 27
<211> 5
<212> PRT
<213> Unknown Organism

<220>
<223> Description of Unknown Organism: Illustrative core
      peptide

<400> 27
Ser Gly Thr Thr Gly
 1   5

<210> 28
<211> 7
<212> PRT
<213> Unknown Organism

<220>
<223> Description of Unknown Organism: Illustrative core
      peptide

<400> 28
Gly Glu Leu Cys Ile Gly Gly
 1   5

<210> 29
<211> 8
<212> PRT
<213> Unknown Organism

<220>
<223> Description of Unknown Organism: Illustrative core
      peptide

<400> 29
Arg Ile Glu Leu Gly Glu Ile Glu
 1   5

<210> 30
<211> 5
<212> PRT
<213> Unknown Organism

<220>
<223> Description of Unknown Organism: Illustrative core
      peptide

<400> 30
Leu Gly Gly His Ser
 1   5

```
<210> 31
<211> 578
<212> PRT
<213> Myxococcus xanthus

<220>
<221> MOD_RES
<222> (13)..(90)
<223> Variable amino acid

<220>
<221> MOD_RES
<222> (102)..(321)
<223> Variable amino acid

<220>
<221> MOD_RES
<222> (336)..(358)
<223> Variable amino acid

<220>
<221> MOD_RES
<222> (365)..(387)
<223> Variable amino acid

<220>
<221> MOD_RES
<222> (397)..(559)
<223> Variable amino acid

<400> 31
Leu Tyr Ala Gly Val Val Ala Val Pro Val Tyr Pro Xaa Xaa Xaa Xaa
  1               5                  10                  15

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
             20                  25                  30

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
         35                  40                  45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
     50                  55                  60

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 65                  70                  75                  80

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Tyr Thr Ser Gly Ser Thr
                 85                  90                  95

Ala Asp Pro Lys Gly Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
            100                 105                 110

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
        115                 120                 125

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
     130                 135                 140
```

```
Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
145                 150                 155                 160

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
                165                 170                 175

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
            180                 185                 190

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
            195                 200                 205

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
        210                 215                 220

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
225                 230                 235                 240

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
                245                 250                 255

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
            260                 265                 270

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
        275                 280                 285

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
        290                 295                 300

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
305                 310                 315                 320

Xaa Gly Glu Ile Trp Val Arg Gly Pro Ser Val Ala Gln Gly Tyr Xaa
                325                 330                 335

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
            340                 345                 350

Xaa Xaa Xaa Xaa Xaa Xaa Leu Arg Thr Gly Asp Leu Xaa Xaa Xaa Xaa
        355                 360                 365

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
        370                 375                 380

Xaa Xaa Xaa Asn Tyr Tyr Pro Gln Asp Leu Glu Leu Xaa Xaa Xaa Xaa
385                 390                 395                 400

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
                405                 410                 415

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
            420                 425                 430

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
        435                 440                 445
```

```
Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
    450             455             460

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
465             470 ·           475                         480

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
            485             490                 495

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
        500             505                 510

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
        515             520                 525

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
    530             535             540

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Leu
545             550             555                 560

Pro Asp Leu Gly Leu Asp Ser Leu Ala Leu Val Glu Leu Lys His Arg
            565             570                 575

Ile Glu
```

```
<210> 32
<211> 475
<212> PRT
<213> Myxococcus xanthus

<220>
<221> MOD_RES
<222> (13)..(76)
<223> Variable amino acid

<220>
<221> MOD_RES
<222> (88)..(259)
<223> Variable amino acid

<220>
<221> MOD_RES
<222> (274)..(297)
<223> Variable amino acid

<220>
<221> MOD_RES
<222> (304)..(326)
<223> Variable amino acid

<220>
<221> MOD_RES
<222> (336)..(456)
<223> Variable amino acid
```

<400> 32

```
Leu Glu Ala Gly Gly Val Ala Val Pro Leu Asp Pro Xaa Xaa Xaa Xaa
 1               5                  10                  15

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
             20                  25                  30

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
         35                  40                  45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
     50                  55                  60

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Tyr Thr Ser Gly
 65                  70                  75                  80

Ser Thr Gly Gln Pro Lys Gly Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
                 85                  90                  95

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
             100                 105                 110

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
         115                 120                 125

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
     130                 135                 140

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
145                 150                 155                 160

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
             165                 170                 175

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
         180                 185                 190

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
         195                 200                 205

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
     210                 215                 220

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
225                 230                 235                 240

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
             245                 250                 255

Xaa Xaa Xaa Gly Glu Leu Phe Ile Gly Gly Ala Gly Val Ala Arg Gly
         260                 265                 270

Tyr Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
         275                 280                 285

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Tyr Arg Thr Gly Asp Leu Xaa
     290                 295                 300
```

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
305   310   315   320

Xaa Xaa Xaa Xaa Xaa Xaa Phe Arg Ile Glu Phe Glu Glu Ile Glu Xaa
                325   330   335

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
                340   345   350

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
                355   360   365

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
        370   375   380

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
385   390   395   400

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
                405   410   415

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
                420   425   430

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
        435   440   445

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Phe Phe Asp Leu Gly Gly Asn Ser
        450   455   460

Leu Leu Ala Thr Arg Leu Ala Thr Arg Leu Ala
465   470   475

<210> 33
<211> 476
<212> PRT
<213> Myxococcus xanthus

<220>
<221> MOD_RES
<222> (13)..(76)
<223> Variable amino acid

<220>
<221> MOD_RES
<222> (88)..(260)
<223> Variable amino acid

<220>
<221> MOD_RES
<222> (275)..(298)
<223> Variable amino acid

<220>
<221> MOD_RES
<222> (305)..(327)
<223> Variable amino acid

```
<220>
<221> MOD_RES
<222> (337)..(457)
<223> Variable amino acid

<400> 33
Leu Lys Ala Gly Gly Ala Tyr Val Pro Leu Asp Pro Xaa Xaa Xaa Xaa
 1               5                  10                  15

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
             20                  25                  30

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
         35                  40                  45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
     50                  55                  60

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Tyr Thr Ser Gly
 65                  70                  75                  80

Ser Ser Gly Arg Pro Lys Gly Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
             85                  90                  95

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
             100                 105                 110

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
         115                 120                 125

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
     130                 135                 140

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
145                 150                 155                 160

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
             165                 170                 175

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
             180                 185                 190

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
         195                 200                 205

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
     210                 215                 220

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
225                 230                 235                 240

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
             245                 250                 255

Xaa Xaa Xaa Xaa Gly Glu Leu Phe Ile Gly Gly Ser Gly Val Ala Arg
             260                 265                 270
```

```
Gly Tyr Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
        275                 280                 285

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Tyr Arg Thr Gly Asp Leu
        290                 295                 300

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
305                 310                 315                 320

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Tyr Arg Ile Glu Leu Ala Glu Ile Glu
                325                 330                 335

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
            340                 345                 350

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
            355                 360                 365

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
        370                 375                 380

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
385                 390                 395                 400

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
            405                 410                 415

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
            420                 425                 430

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
        435                 440                 445

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Phe Phe Glu Leu Gly Gly Asn
        450                 455                 460

Ser Leu Leu Ala Gly Arg Leu Val Glu Glu Leu Asp
465                 470                 475
```

<210> 34
<211> 486
<212> PRT
<213> Myxococcus xanthus

<220>
<221> MOD_RES
<222> (13)..(79)
<223> Variable amino acid

<220>
<221> MOD_RES
<222> (91)..(269)
<223> Variable amino acid

<220>
<221> MOD_RES
<222> (284)..(307)
<223> Variable amino acid

<220>
<221> MOD_RES
<222> (314)..(336)
<223> Variable amino acid

<220>
<221> MOD_RES
<222> (346)..(467)
<223> Variable amino acid

<400> 34
Leu Lys Ala Gly Gly Ala Tyr Val Pro Leu Asp Pro Xaa Xaa Xaa Xaa
 1   5   10   15

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
            20   25   30

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
        35   40   45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
    50   55   60

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Tyr
65   70   75   80

Thr Ser Gly Ser Thr Gly Thr Pro Lys Ala Xaa Xaa Xaa Xaa Xaa Xaa
                85   90   95

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
            100   105   110

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
        115   120   125

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
    130   135   140

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
145   150   155   160

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
                165   170   175

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
            180   185   190

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
        195   200   205

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
    210   215   220

```
Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
225             230             235                     240

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
            245             250                 255

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Gly Glu Leu
            260             265                 270

Phe Val Gly Gly Val Gly Leu Ala Arg Gly Tyr Xaa Xaa Xaa Xaa Xaa
        275             280             285

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
    290             295             300

Xaa Xaa Xaa Tyr Arg Thr Gly Asp Leu Xaa Xaa Xaa Xaa Xaa Xaa Xaa
305             310             315                     320

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
            325             330                 335

Tyr Arg Val Glu Leu Gly Glu Ile Glu Xaa Xaa Xaa Xaa Xaa Xaa Xaa
        340             345             350

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
    355             360             365

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
    370             375             380

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
385             390             395                     400

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
            405             410                 415

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
            420             425                 430

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
        435             440             445

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
    450             455             460

Xaa Xaa Xaa Phe Phe Glu Val Gly Gly Thr Ser Leu Leu Leu Ala Arg
465             470             475                     480

Leu Ala Ser Arg Leu Leu
            485
```